

THE IRON AGE

April 30, 1931

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USEFUL IDEAS ARE AT A PREMIUM

FEW of us can recall a time when the demands made of the industrial executive have been more exacting than at present. Not only methods but men, as well, are being severely tested.

To "get by" in these lean times requires considerably more ability than in the palmy days of the Coolidge era. Complacency has hit a new low. Interest in improved methods and in business conditions is bumping the top of the chart.

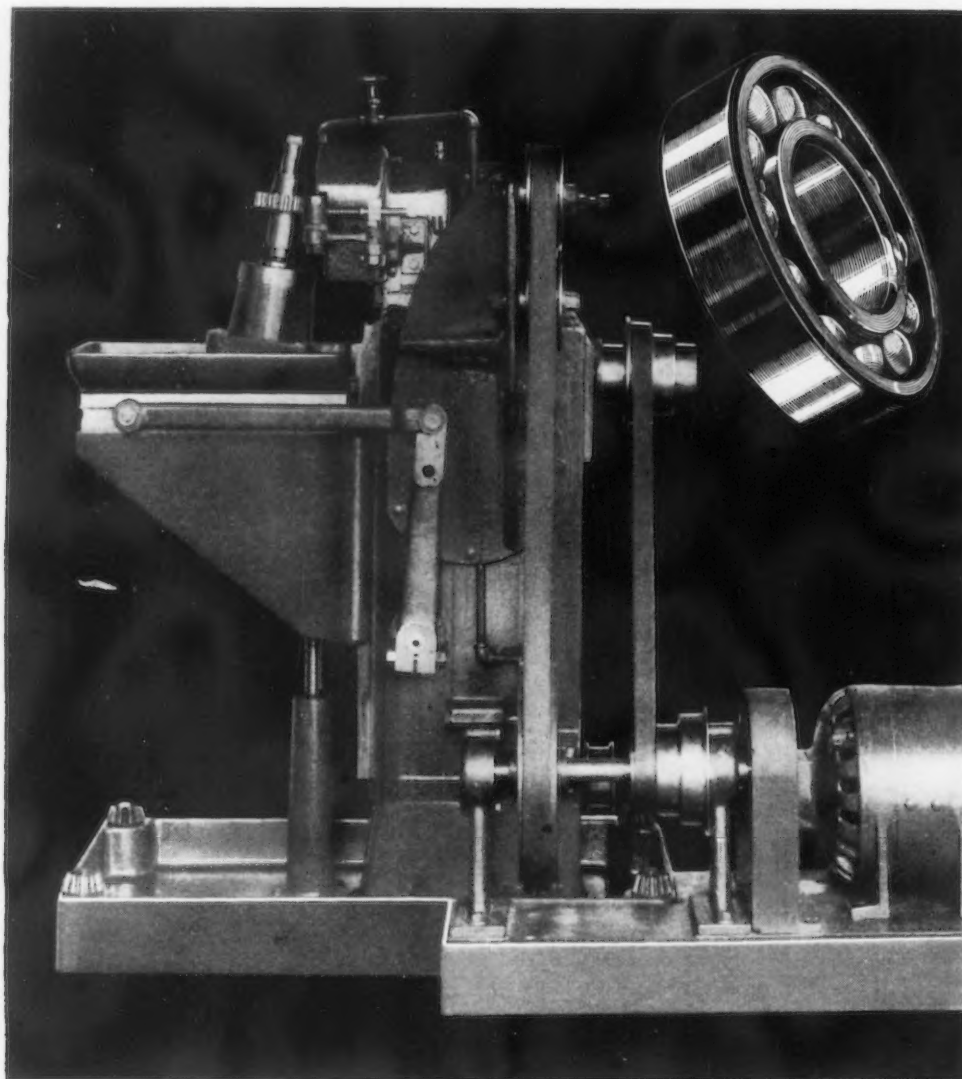
All of which contributes to a closer reading of business papers for ideas that will serve as weapons in the battle against red ink.

The production head of a railway equipment manufacturing company says:

"I am confident that no trade has a publication that equals The Iron Age in keeping its industry informed of important developments."

—A. H. D.

76th
IRON AGE
YEAR



Good bearings help to produce good gears

Good gears are like New Departures in one respect. They do a lot of hard work and do it so well that people are becoming more and more unconscious of their presence in machines and cars. Machines built by the Cross Gear & Engine Company, of Detroit, are playing an important part in the production of good gears. Their tooth-rounding machine is shown here. The accurate work required of this mechanism and the rapidity with which it operates explain the use of New Departures on every vital shaft. The rigidity and accuracy of these bearings are especially valuable to cutter spindle and gear holding head. And to idler pulleys and counter-shaft they bring carefree dependability once-a-year lubrication.

The New Departure Mfg. Co., Bristol, Conn.; Detroit, Chicago, San Francisco.

1722

NEW DEPARTURE BALL BEARINGS

THIS ISSUE IN BRIEF

APRIL 30, 1931

Molding Sand Can Be Too Strong

Frequently the sand is stronger than necessary. Don't make the mistake of increasing the strength. It should be lowered. Tempered clay bond is not friendly with molten iron.—Page 1433.

Cheats Scrap Pile of Twist Drills with Broken Shank

Simply turn a small neck on a round piece of steel, place it in a resistance welder with the drill body, weld and then machine.—Page 1441.

Don't Blame Brittleness on the Weld

Steel that will air-harden becomes brittle after welding because the cold steel adjacent to the weld acts as a chill. Virtually all steels can be welded.—Page 1442.

To Weld High-Speed to Mild Steel

Anneal about 2 in. of the h. s. steel nearest the joint by heating in a lead pot. Preheat the mild steel to a dull red heat in the lead pot. In this way you will get a weld equal in strength to the original metal.—Page 1442.

Resistance Welder Is a Handy Repair Tool

It will salvage broken tools, worn pulleys, bearings, etc., spot-anneal jigs, dies and fixtures, heat parts to be forged, pipe to be bent, etc.—Page 1443.

See-Sawing Hot-Blast Temperatures Eliminated

Blast furnace iron quality is improved and furnace lining life is lengthened by installing a thermocouple in the hot-blast main near bustle pipe to actuate control valves.—Page 1444.

Use Scrap Properly and Save Money

Close sorting is the key to economical use of scrap with alloy scrap becoming more and more of a problem. The scrap dealer cannot sort properly, but the scrap producer can. Marking iron and steel products with a symbol to indicate composition would help greatly.—Page 1424.

Flasks for Massive Steel Castings Give Way to Cores

The production and assembling of cores is now the main problem in the production of such large castings as locomotive foundations.—Page 1416.

Lime Transfers Manganese from the Slag to Basic O.H. Metal

Iron loss in the slag is reduced to a minimum by maintaining the highest silica content consistent with steel quality.—Page 1421.

Trebles Life of deLavaud Pipe Molds

Forging of nickel-chromium steel was good for 1000 pieces of 6-in. pipe. New molds of chrome-molybdenum steel will produce nearly three times as many pieces.—Page 1429.

Molding Sand Moisture Should Be Evident to the Touch

There should be 0.5 per cent more water than sand, tempered to feel dry. This allows lower bond content, hard rammed molds and gives resistance to cutting and burning on.—Page 1432.

Poorly Baked Cores a Frequent Cause of Casting Defects

Such cores do not have sufficient strength or rigidity to remain in place between the chaplet supports.—Page 1436.

Which Shall We Use — Virgin Metal or Scrap?


The economic differential in different districts varies greatly. Under proper control in the foundry and in the scrap yard, the enormous tonnages of scrap now available can be used to the advantage of producer, dealer and consumer.—Page 1422.

Cold-working Salvages Forged Molds.

When mold used in making centrifugally cast pipe develops cracks, it is assembled on a mandrel, inserted in a steel container, ends packed, and water admitted to press the mold down on the mandrel. Mold is then rebored. Second "life" is oftentimes longer than first.—Page 1430.

NEXT WEEK

HANDLING scrap and oil at the S.K.F. ball bearing plant will be discussed in the next issue. Interest lies in a number of details: Direct profit on investment; lower handling costs; reduced car-loading expense, and the promotion of cleanliness and safety.



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RELY  ON ME

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THE IRON AGE

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AN OLD INDUSTRY KEEPS PACE

THE casting of ferrous and non-ferrous products is one of the world's older industries. Tubal Cain was a "worker in metals" and the probabilities are that he bore the scars of molten metal.

No indications are apparent that this age-old industry is in danger of being superseded. For, despite the remarkable developments in forging, welding and stamping, which have rendered valuable service in industrial applications, there is no diminution in our need for castings. Progress is fast enough in this world to absorb all good new ideas without handicapping the progress of those old and tried.

This past year has borne witness to the continued progress of the foundry industry. It has held the pace.

Through the aid of such professional bodies as the American Foundrymen's Association, the Gray Iron Institute, the Steel Founders' Society of America, the Institute of Metals and the Malleable Iron Research Institute, the industry has moved forward distinctly even during a period of severe recession in business.

Evidence of this is to be found in the continued refinement in the physical qualities of gray iron, malleable iron, steel and non-ferrous castings and in the improvement in alloy iron and steel castings.

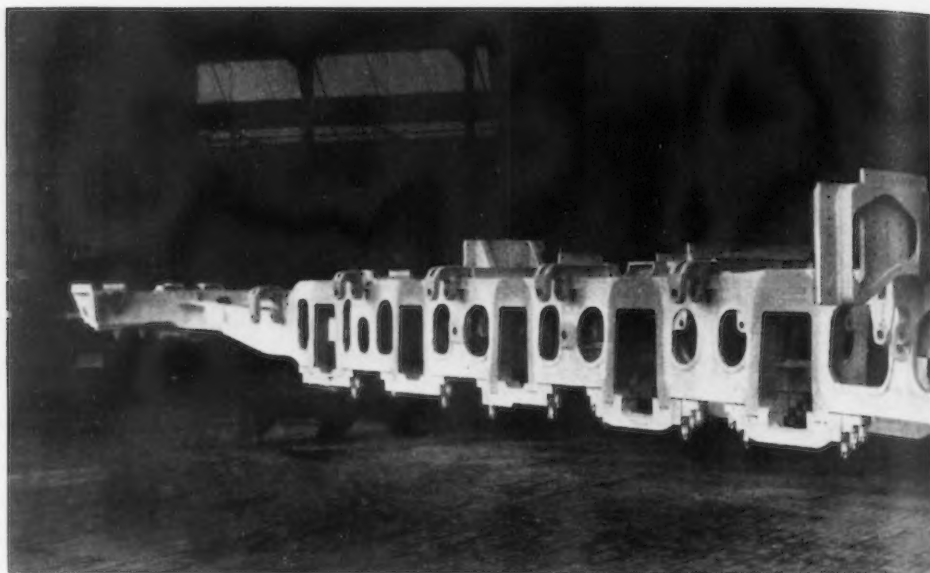
In addition to product refinement, there has been a similar progression in production methods and foundry management. Witness the marked progress in heat treating; the extension and improvement of mechanical handling; the refinement in methods of impact and wear testing; the developments in foundry apprenticeship and cost-keeping.

This issue of **THE IRON AGE** bears witness to some phases of the steady forward progress of the foundry industry.





A TYPICAL foundation or locomotive bed casting made by the company, largely with cores.



MASSIVE CASTINGS MADE WITH CORES IN NEW

RADICAL changes in the methods of producing massive steel castings have developed in the last few years. Less than 20 years ago, among the largest steel castings made were stern posts and stems for battleships, with large frames for locomotives a common product. Today such castings, which in 1910 to 1920 or even in 1925 seemed large and difficult to make successfully, are dwarfed by the massive products cast in the modern steel foundry.

To produce the stern post of a battleship a few years ago, when the writer was connected with a foundry which made such castings a specialty, large and cumbersome flasks were required, often made in sections. Complicated cores were necessary. The drying of such molds and cores was a problem by itself, to say nothing of the handling of them. Skill in molding was

paramount. Assembling of the dried mold, with its cores, required great care and much time. Pouring of the final casting was a signal event, fraught with keen tension. Usually two or three heats were simultaneously poured into a long mold in a pit.

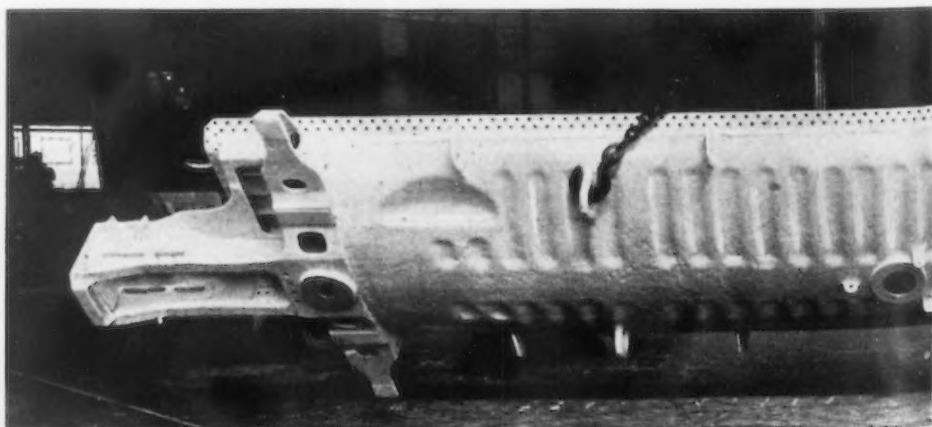
And the suspense was not over for some days, perhaps a week, until it was certain that the final product had no defects, such as shifted cores, or cracks or scabs. The same was true to lesser degree in the case of locomotive frames. Molds for these, 35 to 45 ft. long, required careful drying, with the annealing and straightening of the final product always a problem.

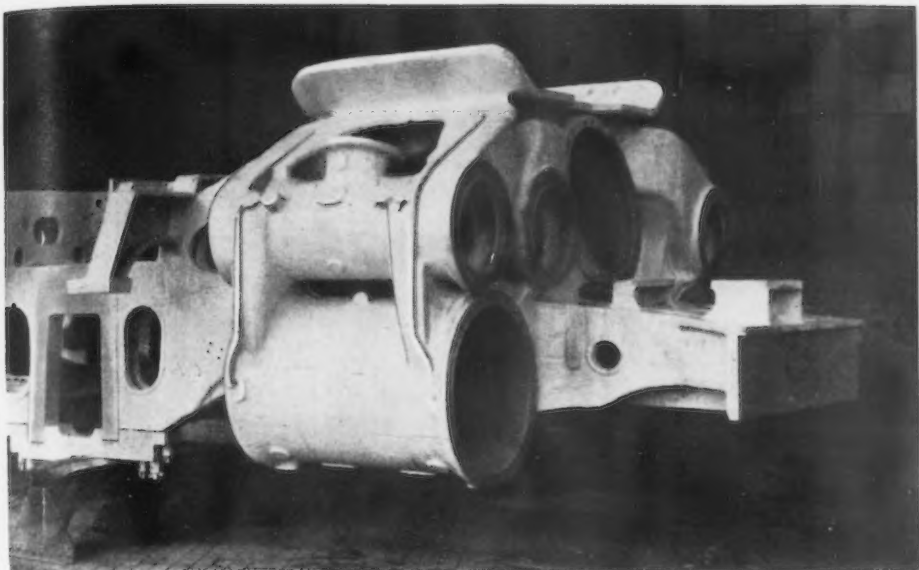
Large Cores Displacing Heavy Flasks

Today, according to the latest practice, cumbersome and expensive flasks are disappearing. In fact the locomotive frame is gradually vanishing as a separate



UNDERFRAMES for large tank cars are another type of large casting made by the corporation.





By EDWIN F. CONE
Associate Editor, The Iron Age

STEEL FOUNDRY

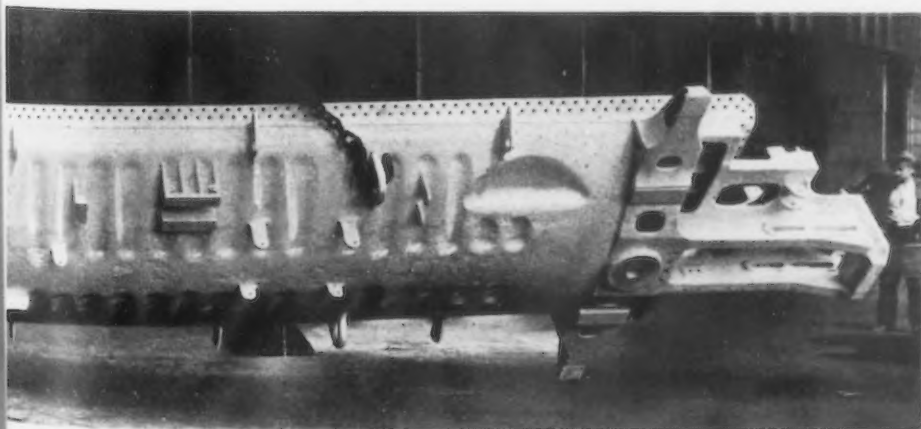
casting. It is now part of what is known as foundation castings for locomotives—marvels of workmanship as integral steel castings and beautiful and impressive in appearance.

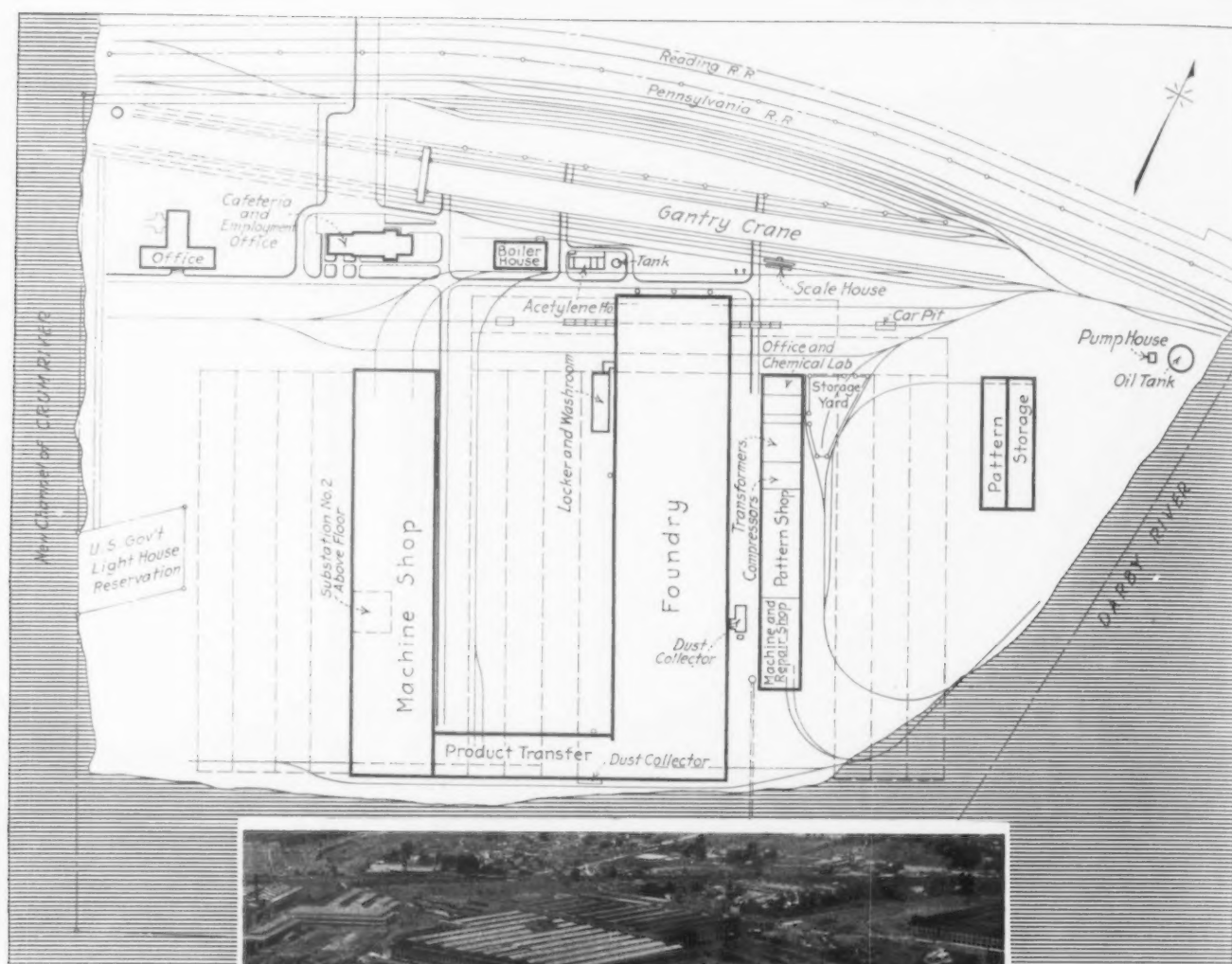
As some of the illustrations show, the foundation casting—60 ft. long in some cases—is made up of the two frames, the cylinders, the cross ties or pieces, the driving boxes, the bumper body and even the platform of the cab. A short time ago it would have been regarded as a wild dream to make, as one casting, the parts which then were produced separately and afterward assembled in the finished locomotive.

To produce these large castings, steel foundry molding practice has changed markedly. Flasks have largely given place to massive cores. The production and assembling of cores is now the main problem in

THE use of large cores instead of heavy flasks and molds for making massive steel castings has resulted in a radical modification of former steel foundry practice and in the production of larger and more complicated castings than ever before. Leading features of a new \$13,000,000 foundry designed to make these castings on an extensive scale are surveyed in this article.

the production of such large castings, and the building and equipment of a foundry for such products is an entirely different problem from what it was a few years ago. With success assured in such a method of making large pieces, the advantages are many and readily evident—a minimum handling of integral





PLAN of the arrangement of the plant of the General Steel Castings Corpn.



AIRPLANE view of the plant, showing its location on the Delaware River.

castings, less expense in the preparation and assembling, and a product probably stronger.

A \$13,000,000 Plant Built on a Swamp

To meet these new conditions, a group of interests, engaged in the manufacture of locomotives and large castings in general, organized a company early in 1929 and built a modern steel foundry at Eddystone, Pa., under the name General Steel Castings Corpn. The companies back of it are American Locomotive Co., Baldwin Locomotive Works and American Steel Foundries.

The plant erected cost \$13,000,000. The first heat was poured last year. Just previous to this, pioneer work in this type of castings had been done by the Commonwealth Steel Co., Granite City, Ill., which is now the Commonwealth Division of the new company. Details of the organization and development of the new company were published at the time.

The new plant is an impressive testimonial to the modern trend in steel foundry practice. Only a few of its many features can be touched on in this article. By way of introduction, a few facts concerning the



▲ ▲ ▲ THIS continuous core oven will dry 800 tons of cores per day and is claimed to be the largest ever built.

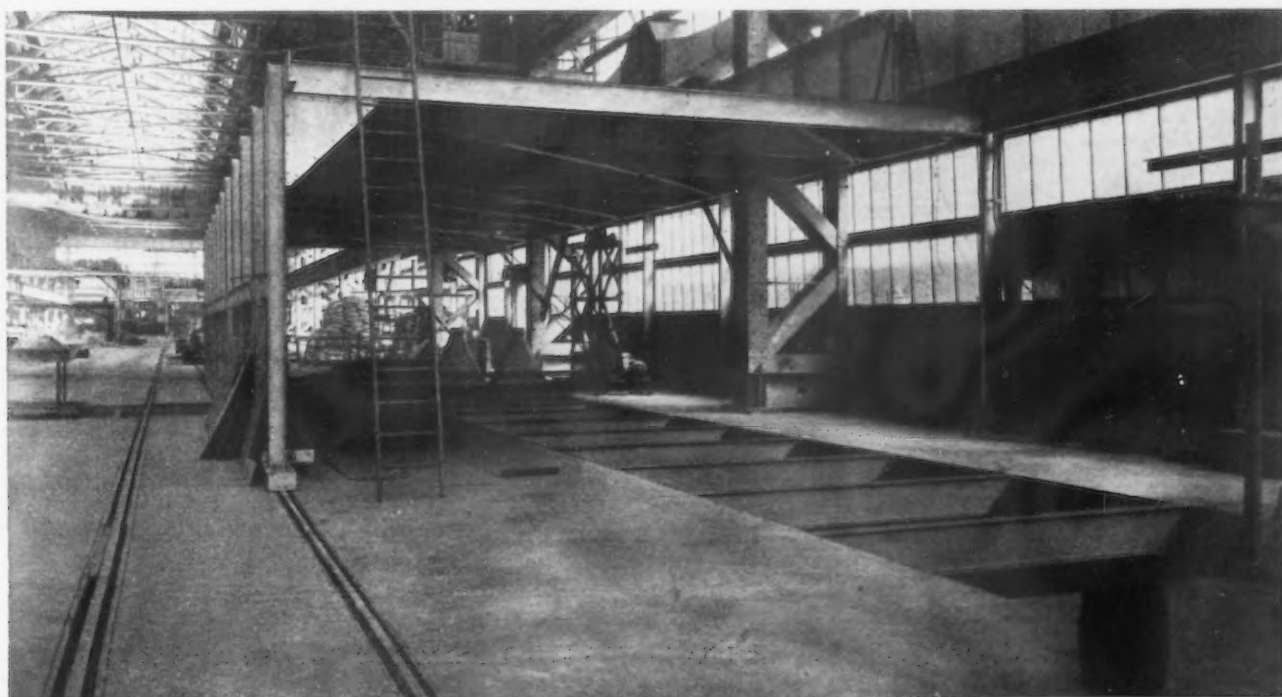
engineering problems in its construction are of marked interest.

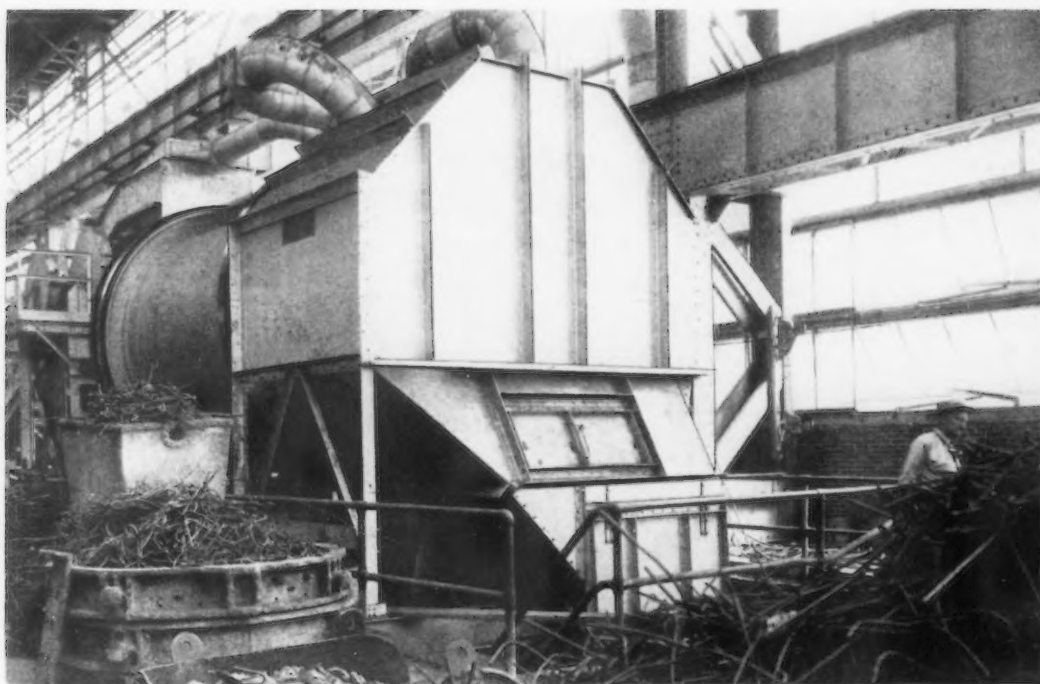
As a location, a site, which originally was nothing but a swamp on the Delaware River, was selected—adjacent to the large plant of the Baldwin Locomotive Works, also at Eddystone. The original area was 99 acres of ground, the total acreage now being 113 acres to the bulkhead line, with water navigation on three

sides. There is also direct connection with the Pennsylvania Railroad and the Reading Co.

To prepare the swamp for the erection of buildings, approximately 900,000 cu. yd., or about 20,000 carloads, of filling material were deposited. Major construction required about one year, during which 35,000 cars of material were received, 120 cars being unloaded per day in some months.

A SHAKE-OUT house which is movable and which will take care of very large castings. ▲ ▲ ▲





THIS core breaker is designed to break up large cores, to separate the dust and rods and to return sand of predetermined quality to the foundry.

To support all the structures, including sewers, water mains and so on, over 24,000 wooden piles were driven, varying in length from 30 ft. to 55 ft. The total floor area covered by the buildings is 680,000 sq. ft. or about 16 acres.

The main foundry building covers about 7½ acres with about 5 acres in the product machine shop, these two buildings being the principal producing portions of the plant. About 26,000 tons of structural steel was required. To assure maximum lighting, there are 258,000 sq. ft. of glass in the roofs and 434,000 sq. ft. in the side walls and monitors—692,000 sq. ft. or 16¼ acres in all. To put in place the side-wall glass, 90 tons of putty was consumed.

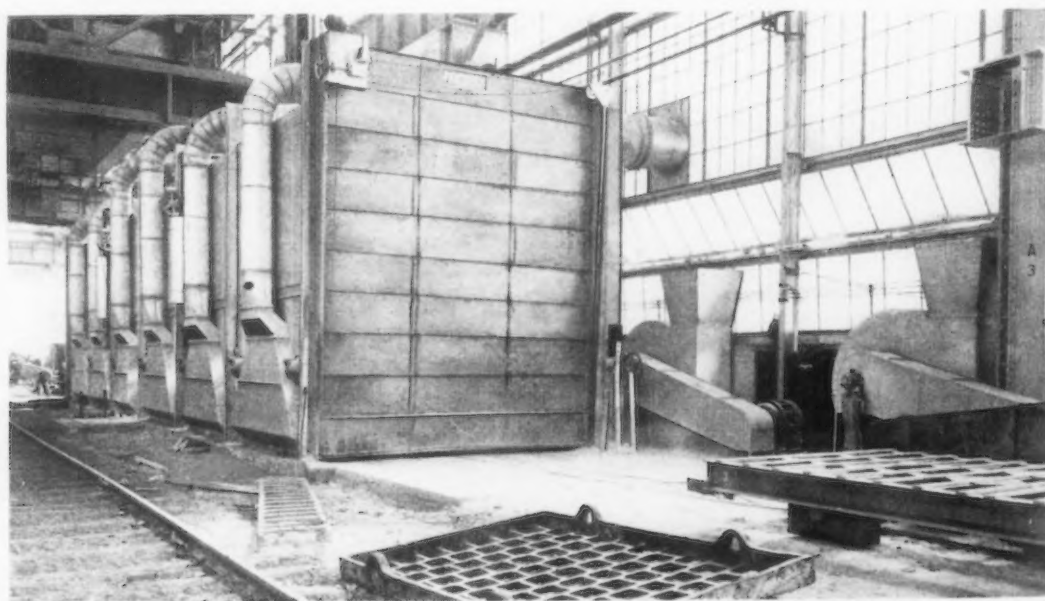
Foundry and Machine Shop Very Large

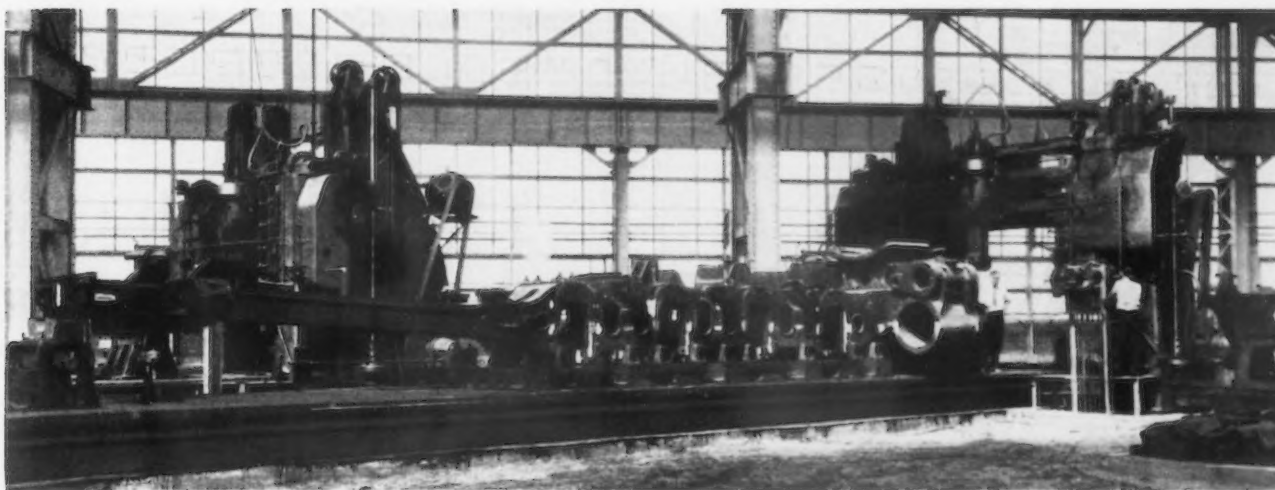
Of the eight buildings the two largest and most striking are the foundry and the machine shop. These are connected by a transfer building. The foundry is

1170 ft. long and 270 ft. wide. The machine shop is 990 ft. long and 192 ft. wide. At one end of the foundry is the open-hearth department, equipped with three 50-ton oil-fired, basic open-hearth furnaces of the Stevens type in which are used the latest means of atmosphere and combustion control. The capacity of the plant is about 60,000 tons of steel castings annually, running up to 150,000 lb. in weight per casting. In the whole plant there are 42 overhead cranes of 2 to 75 tons capacity.

Besides the open-hearth furnaces, there is one mold drying oven, a large continuous core oven and two annealing furnaces. All are fired with fuel oil, requiring about 1000 gal. an hour when in full operation. The feature of this equipment is the large continuous core oven which has a capacity of 800 tons of cores per 24 hr. and full automatic control as to temperature and time of cores in the oven. This is the oven which is the main spring of the plant for drying

THIS sand blast house will clean the largest castings produced.





the very large cores for the foundation and similar large castings.

Sand Handling System a Feature

Two extensive sand handling systems have been installed. Each one has a capacity of 75 tons an hour. An adequate description would require a separate article. Some of the features include a movable shake-out house; a breaker which breaks cores, separates dust, rods and other material, and returns sand of predetermined quality to the system; a special measuring and proportioning equipment over the sand mills; and sand slingers.

Pouring pits are among other features, all of which cannot be included in this survey. Most of the large castings are poured in pits on the main floor of the foundry. In these the cores are assembled from the continuous oven. The numerous pits vary in size, some being 20 ft. by 80 ft., some 90 ft. square, with the depth ranging from 6 ft. to 12 ft. There are about 36,000 sq. ft. taken up by such pits.

The machine shop is equipped with some very large machine tools for finish machining the locomotive bed, car bottom and similar large castings. The equipment includes planer-type milling machines, planer combination planers and slotters, drilling machines, hydraulic presses, double cylinder and valve chamber boring machines. The tables of all machines of planer type are of standard design, so that all fixtures and set-ups are interchangeable. There is also smaller equipment for the miscellaneous castings produced. All of the

A LOCOMOTIVE bed casting on one of the planers for machining.



planer-type machines have a bed 135 ft. long suitable for taking care of the large locomotive foundation castings. One of these in position for machining is reproduced above.

Large Acetylene Plant Provided

Another feature is the oxy-acetylene plant. Both the oxygen and acetylene are manufactured in a structure outside the main buildings and then piped throughout the plant. The gas is used for cutting heads and risers and for welding. The length of the piping required for supplying the gases to all parts of the plant is 36,000 ft.

Provision for sand blasting has also been made. One large unit has been installed, 16 ft. by 70 ft., in which a complete locomotive bed may be cleaned at one time, arranged so that eight sand blast men can operate simultaneously.

Composition of Basic Open-Hearth Slags

CERTAIN regularities in the composition of basic open-hearth slags were ascertained by S. Schleicher (*Stahl und Eisen*, Dec. 18, 1930) in the analyses from 29 varied heats. While the MnO content of these slags ranged from 28 to 12 per cent, the average sum of MnO + CaO + MgO was 61.4 per cent, with a maximum variation from the mean of 1.87 per cent. This finding agrees with results of other work in which a mean of 25 heats gave the value 61.53 per cent while the MnO varied from 12 to 5 per cent, and the average sum from six electric heats with MnO from 0.26 to 4 per cent was 61.58. High acidity in slags

was accompanied by low iron content. Thus for iron contents between 17 and 2.5 per cent, the sum of SiO₂ + P₂O₅ ranged from 12 to 31 per cent respectively. The above figures apply to low-carbon heats. In high-carbon heats, MnO + CaO + MgO was found to be about 65.5 per cent, and the iron content for a given acidity was lower than in the low-carbon melts.

The results show that addition of lime to a finishing slag causes transfer of manganese to the metal, and that iron loss in the slag is reduced to a minimum by maintaining the highest silica content consistent with steel quality.

WHEN TO USE SCRAP IN THE FOUNDRY

By E. K. SMITH and F. B. RIGGAN

Metallurgists, Birmingham, Ala.

THE *proper* use of scrap will materially contribute to the *profits* of nearly every brand of industry."

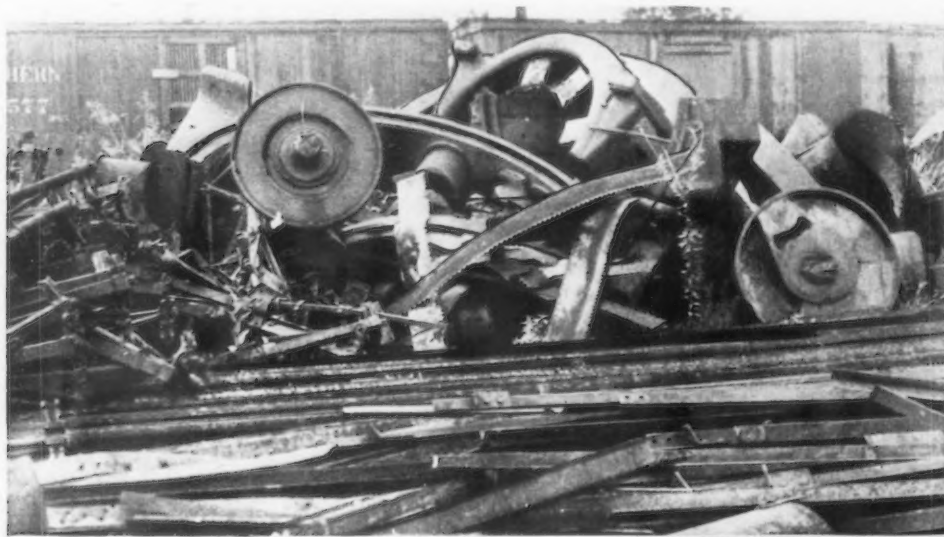
This quotation (the italics being ours), from a recent Government publication, states a fact which is being more and more clearly recognized. However, the use of scrap has received a great and deserved increase during recent years and, in considering this, it is as well to keep in mind the converse of the above quotation:

The *improper* use of scrap will materially contribute to *losses* in nearly every brand of industry.

One of the outstanding lessons of the World War was the enormous importance of raw materials for

national welfare. In particular, iron and steel are indispensable in peaceful developments—doubly so in time of war. We have become accustomed to think of our inexhaustible supplies of iron ore, but at the present rate the good ore is being rapidly depleted, and national safety requires the conserving of this all-important material. It is hardly necessary to point out, as in the past, that old harvesters or outworn automobiles, rusting away in the fields, are a blot on the landscape—such a sight indicates a needless waste of a precious raw material.

It is indeed fortunate that iron is practically indestructible; it only remains that old iron and steel be collected and re-made. But a first condition to



▲ ▲ ▲
All kinds of miscellaneous scrap in this pile from saws to housings of machines.

Many assortments of scrap in a junk yard where pieces of all sizes collect.

▼ ▼ ▼



IMPROPER use of scrap will materially contribute to losses in nearly every line of industry.

About 725,000,000 tons of iron and steel is in use in the United States, most of which will some day be used as scrap.

Proper sorting is the prime consideration in the use of scrap.

Alloy scrap should be segregated by the producer; the dealer is helpless to effect a separation.

Steel scrap is now used to improve the quality of gray iron.

In malleable practice, metallurgical control of scrap is particularly necessary for the effect of alloys is drastic either in promoting or inhibiting graphitization.

The average differential between pig iron and scrap is about \$4.

the collection of scrap metal is that there be a market for it at a price which makes its collection and sale profitable. This in turn implies the regular use of each separate kind of scrap, so as to insure a reasonably continuous market.

The magnitude of the problem of using all scrap may be appreciated when it is stated that "there is in use in the United States about 725 millions of tons of iron and steel—and that most of this will some day be used as scrap."

Realization of the need for conservation has been growing rapidly, the enormous total of 50,000,000

tons of iron and steel scrap having been remelted last year. At the same time, the stigma sometime associated with the collection and use of scrap, has been removed. The humble "junk" dealer is rapidly earning an honorable place as a vitally important cog in the conservation of national resources. And the plant metallurgist can improve his mixtures—and possibly his costs—by the judicious use of scrap, without casting suspicion on his product, as in the past.

If the conservation of iron and steel has become important and complex, the conservation and use of

▲ ▲ ▲
Car wheels are typical of heavy melting scrap and are a desirable type.



An alligator shear and its food. It cuts the scrap into small pieces.
▼ ▼ ▼

alloys has become more so. For, metallurgically speaking, we are just entering the "Age of Alloys." In passing, it is worthy of note that the development of alloys constitutes one of the greatest steps ever made in the conservation of national resources. This has acted in two ways. Heavy sections of relatively weak metals are being replaced by lighter sections of the stronger alloy irons and steels. And metal parts, which formerly rusted away to nothing, are now being made of indestructible alloys which should serve us, in one form or another, indefinitely.

Collection and Preparation of Scrap

The foundation for the use of scrap lies in its proper sorting. This is relatively simple where large producers, such as railroads, automotive companies and extensive salvaging yards have both equipment and personnel for the accurate division of old materials. The inevitable result is that such material is more valuable than mixed scrap. On the other hand, some producers and dealers, both large and small, have neither space nor inclination for close sorting, with the result that their product is not so desirable.

It is essential that both producer and dealer be shown more of the metallurgical reasons for scrap classification. For instance, the dealer sometimes feels that a metallurgist is unreasonable, because he objects to cast scrap being mixed with malleable scrap. He argued, in one case, that as cast scrap was selling at \$2 a ton more than malleable, that the buyer was getting the better end of the bargain. He did not realize that the high phosphorus in the cast scrap would be very harmful to the malleable mixtures.

The dealer should have a working knowledge of the more common principles of mixtures. He has been known to criticize the metallurgist as an unreasonable theorist, because the latter objects to the presence of chrome steel in scrap bought for malleable mixtures, while he passes gladly the same material for the gray iron cupolas. It would seem that the metallurgical fraternity could, to advantage, sell the dealer his ideas by word-of-mouth or through the dealer's trade papers or organizations. Technical data and specifications could be covered. This closer contact would result in better understanding and fewer rejections, which in some cases are extremely costly. The present method of sending metallurgical information to the dealer, via the purchasing department, is wasteful of time and often ineffective.

Alloy Scrap a Problem

The economic disposal of alloy scrap is getting to be of major interest to producer, dealer and consumer. Alloys are being used in ever-increasing amounts in cast iron as well as in steel. And where

nickel and chromium were formerly the only common alloys, now we find also molybdenum, vanadium, manganese, copper, tungsten, cobalt and others.

Owing to the complexity of the problem, there has grown a feeling that alloys in scrap constitute a real liability to the dealer. This will not be the case when scrap can be properly classified as to alloy content. Then alloys will be far from a liability—in many cases they will be the most valuable part of the scrap. Many consumers would use far more alloy scrap, if they could be sure of its classification, and would be willing to pay a premium, where now they either do not buy the material at all or want a reduced price.

A very timely suggestion was recently made before a convention, that all alloy scrap be segregated by the producer for, when it is once mixed, the dealer is helpless to effect a separation. The practice of strict separation of alloy scrap and its sale according to its analysis would be of immense value to all concerned.

The widespread use of the S. A. E. numbers, indicating composition for alloys and carbon, suggests a possible method for scrap segregation. It is now customary for many iron and steel products, whether cast, rolled, or forged, to be labeled with the manufacturer's trademark or name. It would be equally simple for such iron and steel products to be marked with some numerical symbol, similar to that of the S. A. E., indicating type of alloy and approximate composition.

Such a system would be an advantage to the producer of scrap, as he would obtain full value for whatever alloy scrap he might have for sale. It would be of benefit to the dealer, as he would be sure of just what alloys he was buying and, in case of mixed material, he could sort accurately and obtain a far better price for the sorted alloy scrap than he could for the mixed product. It would be of great value to the metallurgist in using to advantage the increasing volume of complex alloy scrap, particularly in the case of metals requiring close control of composition.

Scrap Used to Improve Quality of Gray Iron

Years ago foundrymen learned that the addition of steel scrap to their mixtures gave gray iron increased strength. Since that time this use of steel has been elaborated so that at present there are numbers of processes for the production of high-strength irons, depending wholly or partly on the melting of steel scrap in the cupola. The German "Perlit" iron and semi-steels are examples.

A newer development, the melting of steel scrap in the cupola, with additions of alloys, has resulted in cast irons with strengths of well over 60,000 lb. per sq. in. The often-expressed fear that small in-



cidental amounts of alloys in scrap would be detrimental to gray iron is not well founded. In all probability such alloys act as cleansers and strengtheners.

Close Control Necessary

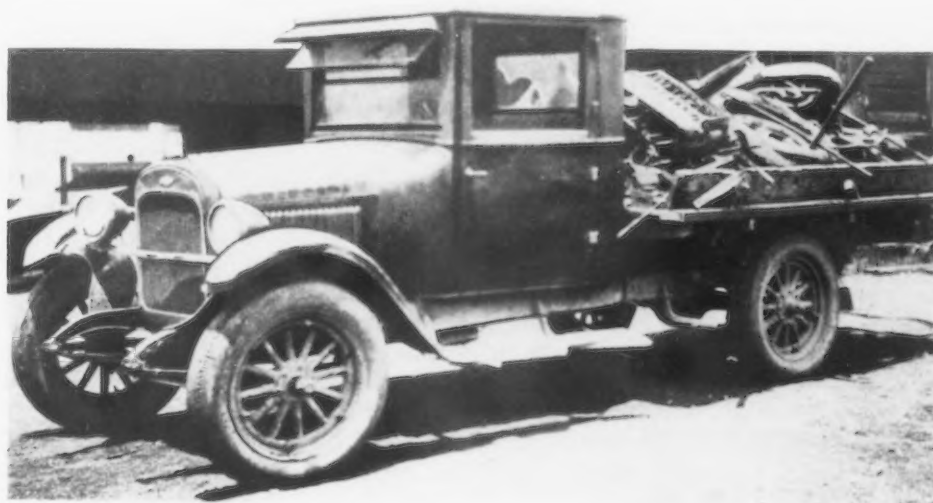
"It is extremely inadvisable to use any large proportion of outside scrap in mixtures, unless there is close technical supervision of materials and mixtures. Buying on specification is desirable, but close inspection of scrap received, and frequent analyses



This load represents mixed scrap gathered in the country.

♦ ♦ ♦

It is a far cry from this horseless carriage to the modern type, which are prolific sources of scrap.



are essential. In some of the very modern plants the spectroscopic and spark tests are used.

If close control is desirable for the scrap consumer, it is equally so for the dealer. Any improvements in the technical control of scrap sorting in the dealers' yards will be welcomed by the consumers. The new method of scrapping automobiles, by means of which all materials are used to fullest advantage, is an excellent example of efficient scrap control.

In malleable work metallurgical control is particularly necessary for the effect of alloys is drastic, either in promoting or inhibiting graphitization.

Alloys are becoming most interesting tools by

means of which the plant metallurgist is enabled to produce the modern high-strength ferrous metals. This works in two ways. He can use to great advantage the alloys which purchased scrap contains. He also uses various alloys to enable him to cheapen the cost of his mixtures, either by using more bought scrap or by buying lower silicon pig iron.

Cost Differentials

From the technical standpoint, the use of scrap deals mostly with the question of quality. The

economic view treats of conservation of national resources. After all, the whole matter of using scrap supplies comes down to a question of service to the public, which means maximum performance at a minimum cost. All this, in turn, brings us to the subject of price differentials between new metals and scrap. And the opinions on this are as varied as the kinds of scrap!

The old hit-or-miss method was to wait until the price of scrap was so low that an apparent saving could be made by its substitution for pig iron. As often as not the result was the purchase of badly rusted material which was a liability at any price. There is sometimes a tendency to swing too far in the other direction. In other words, the price of used material is so high in proportion to virgin metal that its use is attended by a financial loss. In order that the great tonnage of scrap iron and steel may be used to profit of all concerned, there must be a delicate balance between the price of "primary" and "secondary" metal, and this balance is affected by dozens of factors in the collection and use of scrap metals.

In the matter of price differentials, it is sometimes the old story of "Killing the Goose that Laid the Golden Eggs." A typical case of this may serve as illustration. A certain kind of scrap was practically a drug on the market. A method was worked out for the economic use of this material, which was selling at a differential of \$5 under pig iron. In spite of a quiet market along other lines, the price of this scrap rose to an equivalent of \$1 over the price of pig iron. As this made its use uneconomical, it was discontinued and the price dropped to its former level!

(Concluded on page 1431)

LATE DEVELOPMENTS IN THE deLAVAUD PROCESS

By S. B. CLARK

Research Engineer
United States Pipe & Foundry Co.
Burlington, N. J.

IN making deLavaud pipe, molten iron, taken direct from the cupola, is introduced into a cylindrical metal mold which is slightly inclined to the horizontal. The mold is completely enveloped by hot water and rotated at a comparatively high velocity. The iron is fed into the mold through a trough having a curved spout at its lower end. The trough in turn is supplied with iron by a small ladle of sufficient capacity to make one pipe. This ladle is so designed that, when moved about its point of pivot, a constant, uniform delivery of iron to the trough is maintained.

When the mold is in a position ready for casting, the trough extends down the barrel for nearly its full length. The bell end of the pipe is first cast and the mold is then moved uniformly down the bed away from the spout. The stream of iron, discharging from the spout, flows tangentially on to the surface of the mold, where it is held in place by centrifugal force, and forms a homogeneous pipe.

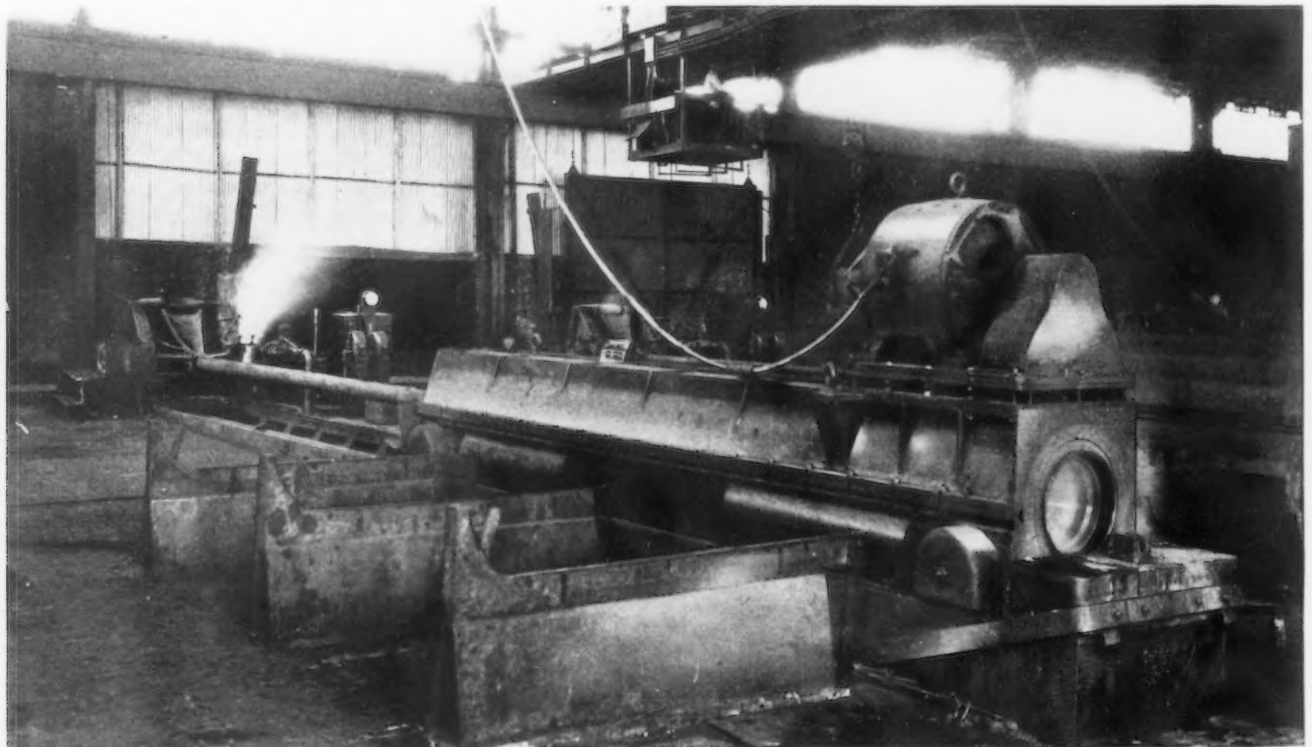
After the pipe is extracted from the mold, an oper-

ation facilitated by the expansion of the mold and the shrinkage of the pipe, it is taken, while still hot, to the annealing furnace. Here it is annealed at temperatures approximating 1700 deg. F. This heat treatment serves to eliminate the slight surface chill by transformation of the carbon from a combined to graphitic form and insures the complete removal of casting strains.

Early History

The application of centrifugal force in producing cast iron pipe is not new, dating back to 1850 or before. The majority of these early attempts embodied the use of a sand-lined mold, although there is some evidence of the trial of steel or cast iron molds, in some cases, split in two halves to form a cope and drag section. None of these earlier experiments proved commercially successful.

In 1914 Dimitri Sensaud deLavaud, a Brazilian and a graduate of L'Ecole Nationale des Ponts et



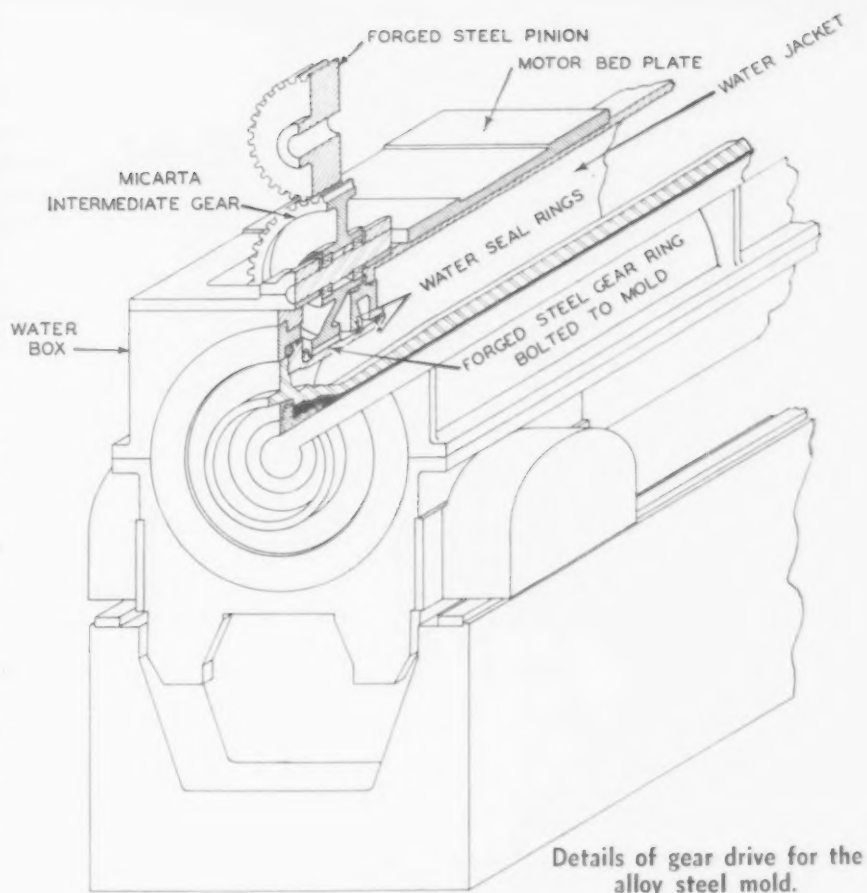
A modern deLavaud machine for casting 18-ft. lengths.

LATE developments in the production of centrifugal cast iron pipe by the deLavaud process are given in this article based on a paper delivered before the American Society of Mechanical Engineers at Birmingham.

Alloy steel molds which have served their purpose are now being reclaimed by a special cold-working process. Their life after recovery has been found equal to or sometimes higher than the original.

Today 24-in. diameter pipe is being successfully produced. Pipe 4 in. to 24 in. in diameter and 18 ft. long will soon be made.

From the time the hot metal leaves the cupola until the finished pipe is ready for shipment only three hours elapses.



Chausees, started experiments in Santos, State of Sao Paulo, Brazil, using a permanent cast iron mold. After many discouraging results a machine was developed. In this machine the mold was water cooled and the iron was first led into a refractory lined trough which, when filled with the proper amount of iron, was dumped sideways through 180 deg.

The first machine of this type was completed in December, 1915, and was reported to be successful. On this machine it was claimed that 10 pipes of 6 in. to 10 in. diameter, and 10 ft. long could be produced hourly. In 1916 deLavaud came to the United States with a view to introducing his process here, and, in order to demonstrate his ideas, built at Buffalo a small 4-in. exhibition machine. THE IRON AGE, in its Sept. 7 issue of that year, published an article describing deLavaud's experiments and claims. Gordon Perry, president of the National Iron Corp., Toronto, Canada, seeing this article, took an option on the Canadian rights and soon thereafter built a machine at Toronto.

The early experiments at Toronto were most discouraging. Continued trouble was experienced in endeavoring to make pipe with the side dumping trough, and further difficulties were encountered due to the binding of the revolving mold in its bearings. More than two years were spent at Toronto ironing out these troubles before the process was thought ready to be placed in commercial operation.

During this period the major developments in the machine itself were made. The trough was replaced by a water-cooled runner and, by moving the mold in relation to the trough, the iron was deposited pro-

gressively onto the surface of the mold. The mold was completely immersed in water, and the present method of mold support and water seal was adopted. These changes and others resulted in the development of a patented machine in which the fundamental principles of design and operation are the same as in the most recent installations.

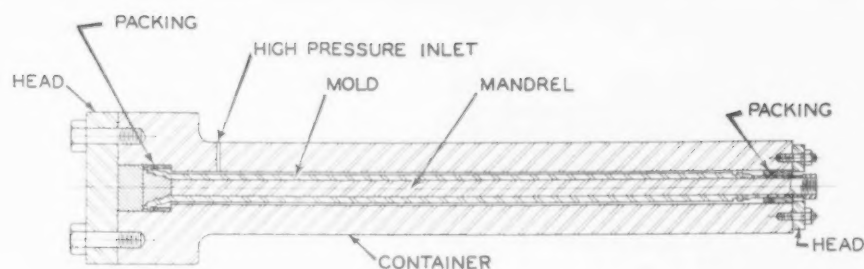
The Stanton Iron Works, Nottingham, England, was the next to adopt this process. It commenced production in the early part of 1921 and by the following year had a four-machine unit in full operation.

In 1921 the United States Pipe & Foundry Co., acquired sole rights for the United States and, after building a small unit at Burlington, N. J., during the latter part of that year, started in September, 1922, a four-machine installation at Birmingham. Soon thereafter the National Cast Iron Pipe Co. of Birmingham, operating under a sub-license, laid down an installation of four machines.

Growth of the Process

Until the latter part of 1922, deLavaud pipe had been produced on a relatively small commercial scale. Previous to this time, the process was in a state of rapid change. The casting machine originally brought to the United States by deLavaud in 1916 had been so modified as to be scarcely recognizable.

In 1922, however, the experimental stage was at an end and the infant process entered a new era, that of mass production. The capacity of the machines was gradually enlarged and the rate of cast trebled. In 1921 a machine, casting 10 to 15 6-in. pipes 12 ft. long per hour was considered to be operating satis-



DETAILS of the Langenberg method of reclaiming alloy steel molds for deLavaud machines.

factorily. By 1926 the same 6-in. machine was averaging 400 pipes per 10-hr. day, a tonnage equivalent to or greater than the largest single-pit cast installation.

In 1925 a machine having a capacity of 14-in. to 20-in. diameter pipe in 12-ft. lengths was installed at Birmingham, and in 1928 a new battery of machines was installed at the same plant to make pipe in diameters up to 12 in. in 18-ft. lengths.

Today 24-in. diameter pipe is being satisfactorily produced and a unit for making 4-in. to 24-in. diameter pipe in 18-ft. lengths will soon be in operation at Burlington. Within the next year a new plant will also be completed by J. B. Clow & Sons, operating under a sub-license, at Coshocton, Ohio. The tonnage of deLavaud pipe produced annually at home and abroad has increased at a rate exceeding all expectations. This rapid growth has been made possible by many improvements in the design of buildings, casting machines, annealing furnaces, and other equipment.

The arrangement of buildings and equipment provides in all cases for perfect "straight-line" operation. From the time a charge of pig iron is picked up in

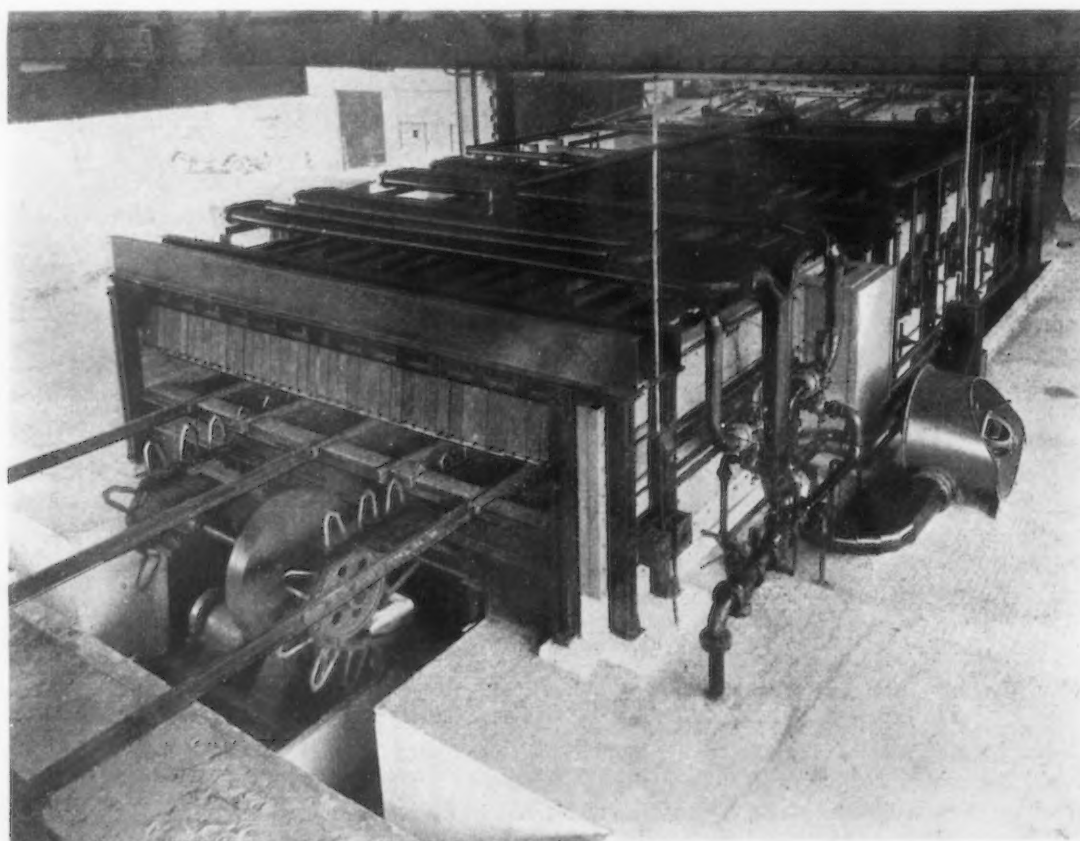
the cupola iron yard to the time the finished pipe is loaded for shipment, a period of less than 3 hr. elapses. By far the longest operation in the complete manufacturing cycle is that of annealing, otherwise the manufacturing time could be radically reduced.

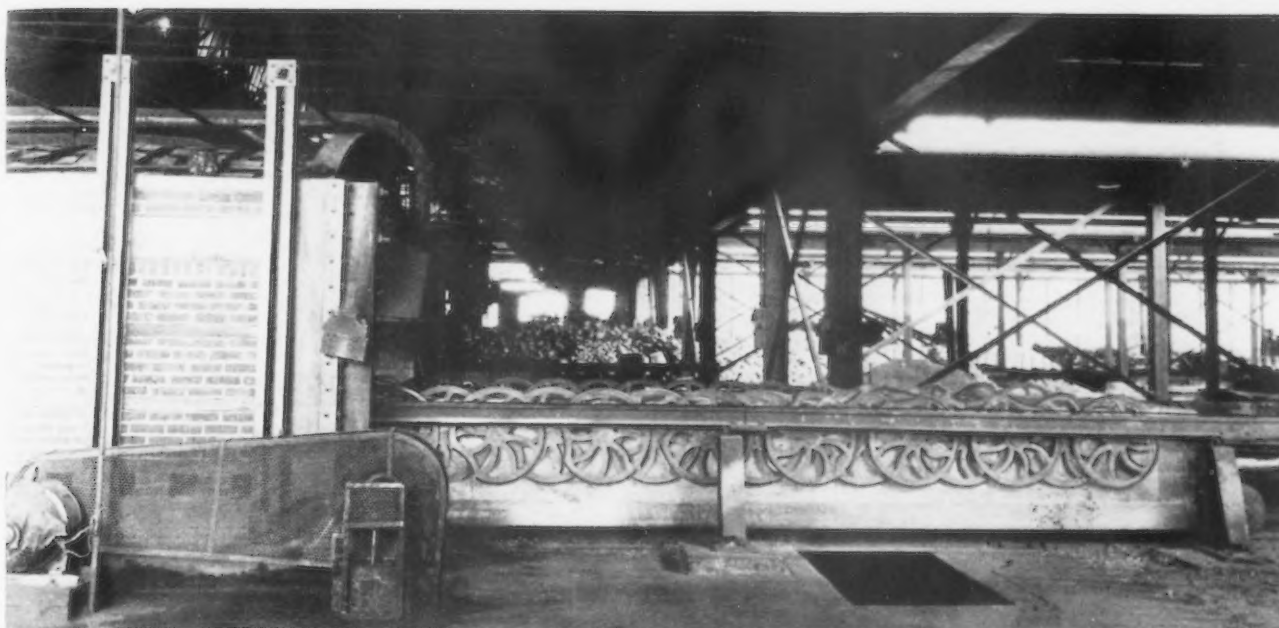
The Casting Machines

In the first commercial type of deLavaud machine the mold was rotated by means of a Pelton wheel mounted on its lower extremity. Aside from the relatively high cost of hydraulic power, this type of drive was deficient in speed control. After trying various types of rope, belt, and chain drives, a direct-gear drive was adopted. The motor pinion and driven gear are made of forged steel, whereas the intermediate gear is of micarta. These gears operate quietly at pitch-line speeds as high as 3500 ft. per min. and, despite the fact that they are continually surrounded by vapor and steam, the average life is high. A planer type, direct-current, variable-speed motor with special ball-bearing mounting, coupled to this positive drive, provides excellent speed control.

On the earlier machines the iron ladle, which supplied iron to the trough, was tilted by means of a

A MODERN furnace for annealing deLavaud pipe.





Side elevation of car hearth partially withdrawn from annealing furnace.

small hydraulic cylinder. The speed of tipping was governed by the amount of opening of a small needle valve controlling the input to this cylinder. This opening was so small that it frequently became clogged with grit, rust, and in several instances even small live fish, which had apparently come through the water-intake screen, were found lodged in the valve seat. Wearing of the cylinder and piston rings and small variations in water pressure also contributed to poor speed control. The substitution of a small, compact motor drive for this hydraulic cylinder eliminated all of these difficulties and insured proper speed control.

The main hydraulic cylinder that moves the water box up and down the bed has been retained. Due to the size of this cylinder and the size of controlling valves, the speed variation of this cylinder is small. Although an electric drive has been tried here also, so far no type of drive has been developed which possesses sufficient power and ruggedness to meet requirements.

Other unusual features of design are the mold-supporting rollers made of tool steel, mounted on roller bearings and running completely submerged in water, and the piston-ring method of water seal which is embodied in these rollers, and also in the end-flange assembly of the water box.

Molds Are Hollow Chrome-Molybdenum Forgings

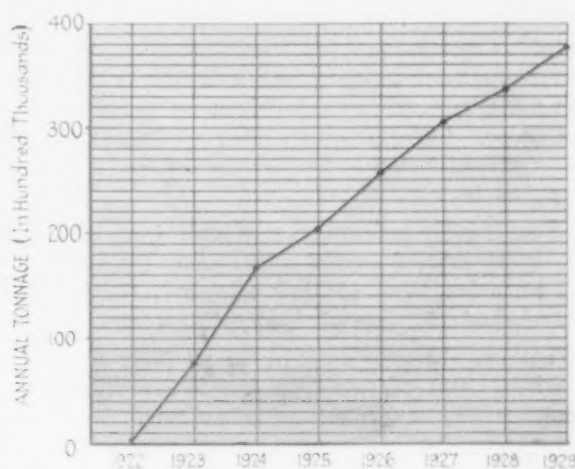
The molds are made from hollow steel forgings which are carefully heat treated and machined within very close tolerances. The earlier molds were made from a nickel-chromium composition. After exhaustive experiments it was discovered that much improved life could be obtained with a chrome-molybdenum steel. In 1923, for example, the life of a 6-in. mold generally averaged about 1000 pieces, while on molds of recent manufacture the average life has been nearly trebled. It is believed that still further improvement can be made in the life and continued experiments are

therefore being made with steel containing various alloys.

Failure of the mold generally occurs on account of the breaking down of the bore. Fire checks and cracks eventually develop of sufficient depth to impede proper withdrawal of the pipe.

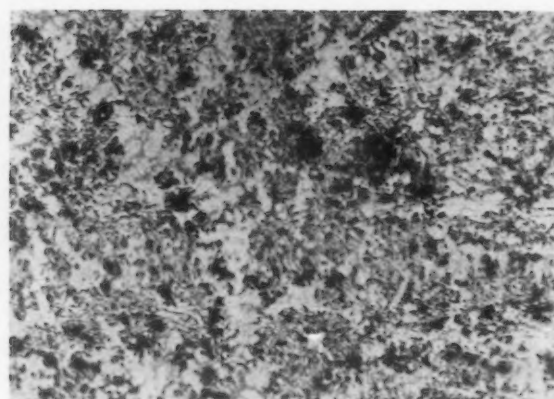
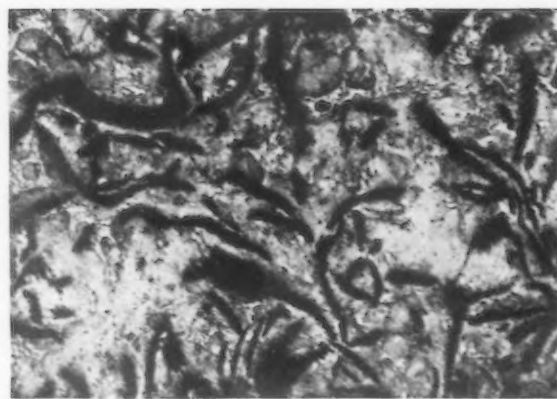
An interesting method of reclaiming such molds, after they have been used to destruction on their original bores, has been developed by Dr. F. C. Langenberg, director of research, United States Pipe & Foundry Co. This process, which is basically a cold-working operation, was developed by Dr. Langenberg at the Watertown Arsenal and applied to the cold working of centrifugally-cast steel guns.

The mold, if required, is first drawn to an even hardness and is then assembled on a mandrel, the diameter of which is carefully computed so that the subsequent reduction in diameter of the mold is sufficient to eliminate the internal scores and checks. The mold and mandrel are next inserted in a very heavy



Annual sales of deLavaud pipe in all countries, excluding Canada.

The Iron Age, April 30, 1931—1429



Photomicrographs showing typical structures X 100. Middle of the wall of pit-cast pipe (left); middle of the wall of deLavaud centrifugal pipe (right).

steel container, and the ends are carefully packed. Water is now admitted into the space between the outside of the mold and the inside of the container at sufficient pressure eventually to squeeze the mold down on the mandrel.

Pressures as high as 50,000 lb. per sq. in. are employed, the necessary pressure, of course, in each case depending on the diameter, thickness, and physical properties of the mold being reworked. After the mold is down on the mandrel, which condition is determined when elongation of the mold ceases, the pressure is released and the mold and mandrel removed from the container. The elastic recovery of the mold in diameter is sufficient to allow the mandrel to be readily extracted. The mold is now rebored to standard inside diameter, turned up on the outside if necessary, and is then ready for further service. This operation can be repeated several times until the wall becomes too thin to be used further.

Results obtained on molds reclaimed in this manner so far have proved highly satisfactory and in numerous cases the life of the mold after reworking has been equal to or higher than the original life.

Annealing Furnace Developments

The first type of furnace used on a commercial basis was a batch type with a combustion chamber 5 ft. wide by 15 ft. long, fired from oil burners located on each side and with a capacity of five 6-in. pipes or three 12-in. pipes, 12 ft. long. The pipe rested on two sets of heat-resistant alloy wheels, the center shafts of which extended to the outside of the furnace where they were driven by suitable worms and gears. The pipes were charged into the furnace and removed after annealing by means of a crude charging device.

The chief disadvantages of this type of furnace were: (1) limited capacity, (2) difficulty of charging and removing pipe, (3) low efficiency, (4) poor heat control, and (5) excessive annealing costs.

The first furnace built in this country at Burlington, N. J., was of this type, but it saw little service except of an experimental character. In Canada, however, until recently this type of furnace has been used more extensively.

The next major development in furnace design resulted in a continuous wheel conveyor-type furnace,

from 30 to 35 ft. long overall and with a hearth on which is mounted an ingenious wheel-type conveyor. The wheels or rather cams are made of heat-resisting alloy, and are driven through a worm shaft running down the center line of the furnace under the hearth insulation. As these cams rotate slowly, the pipes are advanced from one set of rollers to another and are rotated continuously about their own axes.

These furnaces are designed for side firing by either oil or gas, with from five to six burners mounted on each side of the combustion chamber, which constitutes slightly more than one-half of the total length of furnace. The burners were at first regulated by hand, but this method of control was so inaccurate and resulted in such wide variations in temperatures that an automatic-control system was soon adopted. This control system consists of Ryan & Scully solenoid-operated gas (or oil) and air valves, operated by Leeds & Northrup indicating and recording instruments.

Each furnace has two separate control units. The two burners on each side of the entrance end of the furnace are operated by one set of control valves actuated by an indicating controller. The temperatures maintained in this portion of the furnace are well below the maximum temperatures encountered in the rear end of the combustion chamber. The back burners are in turn supplied by another set of gas and air valves, actuated by a recording controller which records on a continuous chart the maximum furnace temperature. The installation of this system of automatic temperature control resulted at once in vastly improved conditions, and the trouble originally frequently encountered due to under or overheated pipe was practically eliminated.

This type of furnace, although vastly superior to the earlier design, still has certain disadvantages. Due to the fact that the pipe is resting on two lines of rollers only, there is some tendency on the 3-in. and 4-in. sizes for the pipe to bow slightly due to the cantilever action of the overhanging ends. Furthermore, the furnace, when operating at maximum rated capacity, discharges the pipe at temperatures above those desired. These furnaces are therefore being rapidly superseded by much longer continuous furnaces of the chain-conveyor type.

The first furnace of this improved design was

placed in operation in Birmingham during 1928. This furnace is 54 ft. long and wide enough to accommodate an 18-ft. pipe. It has a maximum rated heating capacity of 25 tons of pipe per hour in diameters from 4 in. to 12 in.

The pipes are rolled through the furnace on a slight upward incline by means of two parallel chains equipped with heat-resisting alloy pushing fingers of special design. The pipes roll on six parallel lines of staggered alloy skid rails; thus a practically continuous bearing surface is provided which minimizes the danger of bowing or distortion. Due to the fact that the skid rails and pushing fingers reach the same temperature as the pipe themselves there is no danger of cold spots on the pipe at such points of contact and

consequently the furnace can be operated at slightly lower temperatures than were previously practical.

The performance of this type of furnace, both as regards efficiency of operation and the quality of product annealed, has been highly satisfactory. Two furnaces of similar design, which are 75 ft. long overall and which will anneal pipe 18 ft. long, in diameters up to 24 in., will be in operation the early part of 1931.

The foregoing description deals mainly with improvements in design of the casting machine and annealing furnace, the two most novel units of a de-Lavaud plant. Neither space nor time permits of a discussion of the cupola, core making equipment, pipe cleaning, and testing machinery, in all of which corresponding progress has been made.

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When to Use Scrap in the Foundry

(Concluded from page 1425)

The actual economic differential in different districts varies greatly, owing to supply and demand, freight rates, proximity of blast furnaces and scrap yards, and many other factors. Thus it will always be impossible to draw up a table of differentials between the prices of pig iron and scrap to cover all districts. A table, which might be suitable for one city, could well be ridiculous in another. A glance at pig iron and scrap quotations for various iron and steel centers will indicate this.

Figures taken from an extensive survey of pig iron and scrap costs, show that the average differential between pig iron and scrap is about \$4, excluding the steel works where hot pig iron is often used, and where outside differentials might not obtain.

As a substitute for a guesswork method for regulating scrap in mixtures, a typical table is shown, which is an attempt at closer control from both cost and quality considerations.

The table represents only one kind of mixture and the figures are, of course, arbitrary. They are governed by analyses, type of scrap available, melting conditions, etc., and are subject to frequent changes. Such a table must be based on experience, and is simply a guide toward the lowest economic differential between certain specific kinds of scrap and pig iron, together with the figure indicating the highest proportion usable, without technical difficulties.

In different foundries there are widely different

methods in the purchase and use of scrap. Some will not use it under any consideration; others buy any and all kinds, if prices are low enough.

Under proper control in the foundry and in the scrap yard, the enormous tonnages of scrap now available can be used to the mutual profit of producer, dealer and consumer.

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Standards Yearbook, 1931

AN annual review of standards and the operations of standardizing agencies has been issued by the National Bureau of Standards, Washington, in a book of 405 pages. The text is divided into 10 parts, dealing respectively with the various major divisions of the subject. It includes articles in the nature of monographs signed by well-known authorities on the subjects covered, these being in many cases the men in responsible charge of the activities described.

Standardization in transport—a symposium—covers the first 34 pages. Similar space is occupied by the second chapter—international standardization agencies. This is followed by national standardizing agencies, not only of the United States, but of the principal foreign countries, with accounts of what they are trying to do. Then we have Federal standardizing agencies—the different departments of the Government and the bureaus in those departments in which special standards are made or enforced. A separate chapter deals with the National Bureau of Standards, this occupying about one-fifth of the whole volume. Technical and trade association standardizing agencies are listed, and the work ends with an extensive bibliography and cross-index.

Among the activities and accomplishments of the National Bureau of Standards are listed the correlation of our system of measurements with the wave length of the red cadmium line, an extensive research into standardization of radio frequency measurements, and the extensive use of the research and testing facilities of the bureau in aid of the activities of the various other departments of the United States Government. Details of many of the research projects are given briefly, in showing just what the bureau is doing and why.

The Iron Age, April 30, 1931—1431

Minimum Economic Differential Between Pig Iron and Scrap
GRAY IRON MIXTURES

Class of Scrap	Minimum Differential	Maximum Per Cent Usable
Cotton mill cast.....	\$2.00	20
Railroad cast.....	3.00	15
Automotive cast.....	4.00	15
Clean steel scrap.....	4.00	10
Machinery cast.....	3.00	15
Railroad malleable.....	4.00	10
Country mixed.....	6.00	5
Stove plate.....	6.00	5
Borings.....	...	0
Burned scrap.....	...	0

CONTROL OF SAND IS AS

By HARRY W. DIETERT

Research Engineer, United States Radiator Corp.

PROGRESSIVE foundrymen are beginning to devote as much time to control of sand as to control of metal, realizing that more labor-hours are involved in sand than in any other material of the foundry. For example, take a foundry with a daily production of 100 tons. About seven men or 56 labor-hours are required to deliver the molten metal to the floor. On the other hand, labor-hours on the molding floor, including the core room, amount to 1235 hr., or 154 men. In other words, the labor cost of sand working is 22 times as great as the labor cost of metal working.

It should be pointed out that knowledge of working the metal determines the suitability of the molten metal entering the sand mold to produce the casting; knowledge of working the sand determines the probability that the molten metal will result in a good, salable casting. The climax of producing a casting is attained at the time the molten metal reaches the surface of the mold, not only in the quality of the casting, but in the cost.

Sand Tempering a Promising Field for Control

The tempering of sand, consisting of adding to and mixing with the sand the correct amount of water, is a promising field in sand control. Where the sand is controlled to a consistent, high permeability and a medium low strength, the moisture

content should be sufficient to make the presence of moisture evident to the touch of the hand. This should be 0.5 per cent more water than sand, tempered to feel dry. This practice is desirable, as it allows lower bond content, hard rammed molds and gives sand plasticity and resistance to cutting and burning on. Ample moisture content cannot be achieved in strong bonded sands. Fig. 1 shows the appearance of a casting caused by wet sand. Note the surface blow section and the sharp edges around the contour of the blow.

There are two pieces of apparatus for testing the moisture of sand: One is a sand rammer with a moisture indicator attached to the rammer to determine the moisture in a production sand system, and the other is the Grubb moisture tester, which electrically dries the sand and computes its weight before and after the drying process.

Permeability, or venting of a mold, must be present in both the green sand and dry sand portions of the mold. Green sand must vent gases of metal, combustible material, the air in the mold and water vapor, which is by far the largest in volume. Fig. 2 is an example of a defect caused by insufficient green permeability. The defect does not appear on the core side. The metal thickness of the casting is $\frac{1}{2}$ in. Proper permeability for the jolted mold is 120 instead of 60. In many cases defects of this nature may be eliminated by increasing the ferrostatic pressure in the mold.

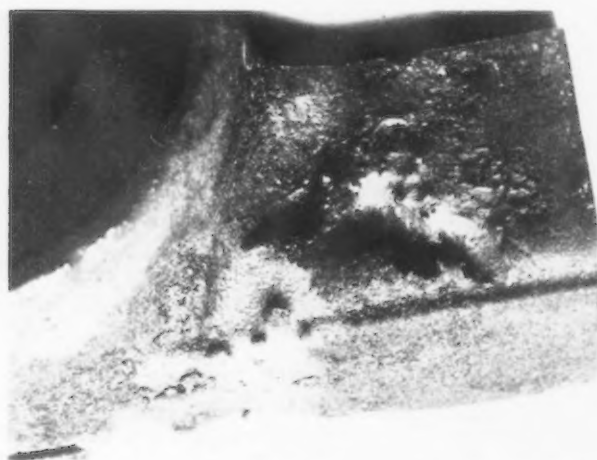


Fig. 1—Appearance of casting defect caused by excessive moisture in the sand (above).



Fig. 2—Casting defect caused by low green permeability (right).

IMPORTANT AS CONTROL OF METAL IN THE FOUNDRY

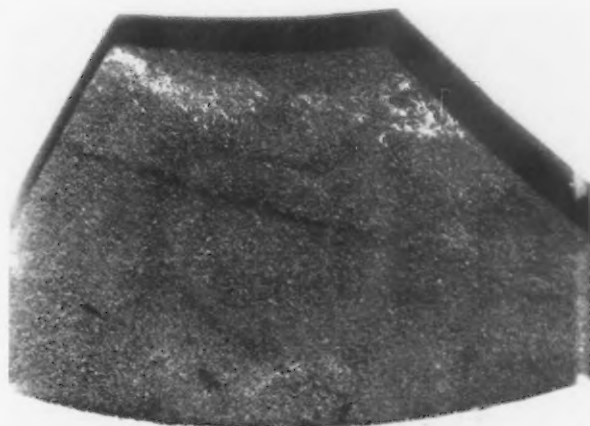
Fig. 3 shows a stove plate casting with a "rat tail" due to low green permeability, which was 18. This was remedied by using a sand with permeability of 25. In Fig. 4 is a blow on a rib of a casting caused by low permeability of the green sand core between the ribs. This condition can be eliminated by augmenting the permeability or reducing the strength of the green sand.

A defect developed by the failure of venting in a baked portion of a mold is illustrated in Fig. 5. This shows a cold shut section surrounded by normal iron. The probable cause of this condition is a low, dry permeability. In the lower right hand corner is a smooth portion where the iron also failed to lie against the core. Uniformity of core mixing is a reliable remedy.

In Fig. 6 is a core blow caused by insufficient venting. The dry permeability of the core is not great enough to take care of all the gases. The core must be freely vented with vents which will not take iron. This blow with the smooth round hole is typical of blows created by iron getting into the vents of the core. Fig. 7 reveals a defect to which much study has been given. The blow does not penetrate the thin wall of the casting; the iron is laid perfectly on the green sand. Losses of this nature have been traced to oxidized iron and therefore eliminated.

Loss Due to Strength of Sand

The strength of molding sand often causes a loss. Too frequently the sand is stronger than nec-



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HERE are given some 20 examples of defects in castings caused by improper molding sand and core practice. The author, who has perfected many types of apparatus for testing sand, offers remedies. The article is based on an address recently delivered before the Detroit Foundrymen's Association.
▼ ▼ ▼

essary. One may feel that the thing to do is to increase the strength, whereas it should be lowered. Tempered clay bond in molding sand is not friendly with molten iron, due to the large amount of water which the clay (with practically zero permeability) holds within itself and to its excessively high shrinkage or rapid drying.

A scab, where the surface of the mold has peeled off by shrinkage or has been kicked off by gas pressure, appears in Figs. 8, 9 and 10. The casting wall is $\frac{5}{8}$ in. thick and the jolt rammed shear strength is 1.1 lb., not 1.7 lb. The remedy to be applied in this case is the addition of silica sand to reduce the green strength, or the reduction of clay bond, or the addition of new sand.

As early as 1356 A.D. foundrymen were troubled with a high strength and low permeability complex,

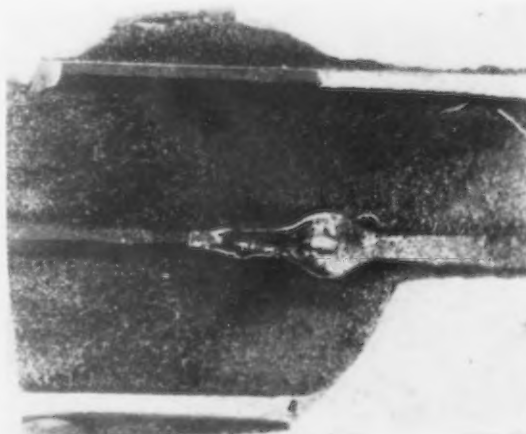


Fig. 3—A defect on stove plate casting caused by low green permeability (at left).

Fig. 4—A blow on a fin of a casting caused by low permeability of the green sand core between the fins (above).

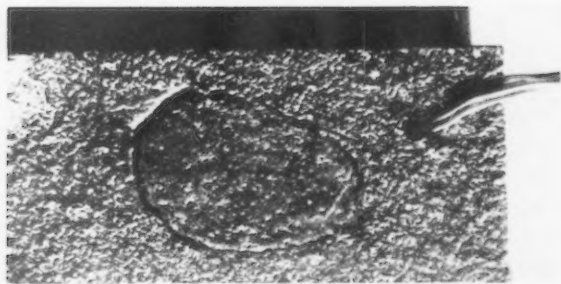


Fig. 5—Core side of a casting showing failure of iron to lie firmly on the dry sand core, due to low dry permeability.

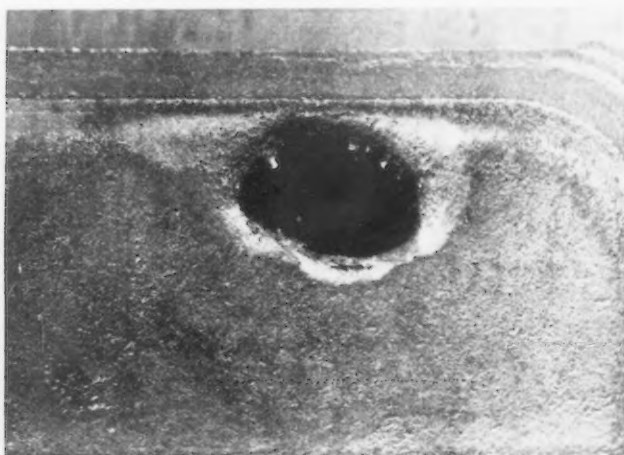


Fig. 6—A blow caused by iron getting into the vent of the core.

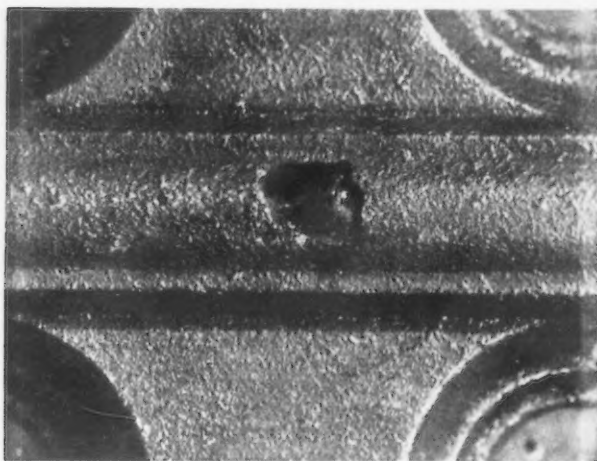


Fig. 7—A blow that does not penetrate the casting. Metal has lain firmly on the green sand surface. Defect caused by oxidized metal and not by sand.



Fig. 8—A scab on green sand side of casting caused by excessive green sand strength.

as illustrated in Fig. 11. This loss is found in many present-day foundries, but its end is approaching with the acceptance of sand control and the resulting increase in knowledge of sand. Unfortunately weak sand, whether caused by brittleness from in-

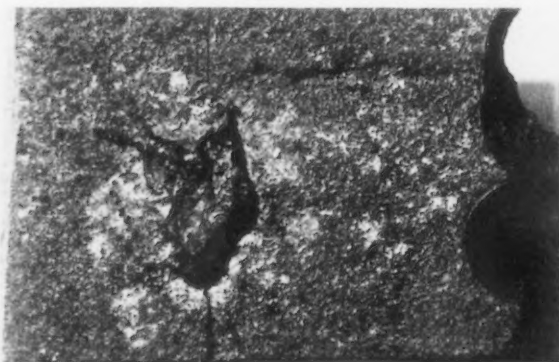


Fig. 9—A scab on surface showing a "rat tail" running horizontal. This clearly demonstrates low permeability due to the use of too much new sand and poor mixing—a combination loss of low permeability and high green strength.

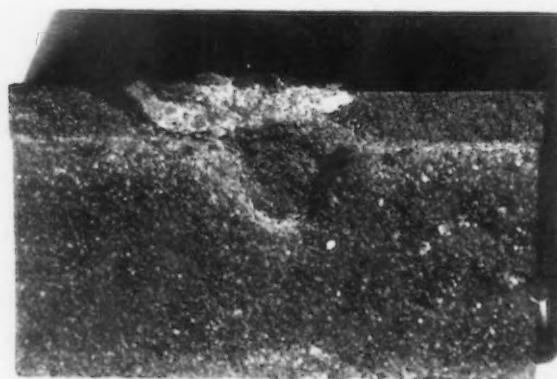


Fig. 10—A cross-section of Fig. 9, showing the sectional appearance of a scab. Note the cavity caused by sand dropping into molten metal and how the molten metal took the place of the sand beyond the surface of the mold.

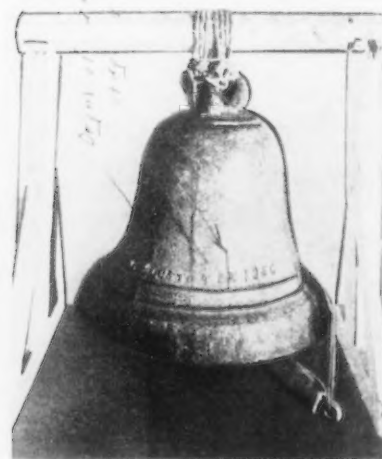


Fig. 11—A Spanish bell of 1356, with seams caused by mold surface shrink cracks. The sand contained excessive clay bond.

sufficient moisture or by lack of clay bond, limits strength figure in a narrow path between low and high strength values. Low moisture results in a low, dry sand strength, which sometimes is caused by the nature of the bond. The appearance of a



Fig. 12—A casting surface defect caused by low dry sand strength.



Fig. 13—Drop caused by sand not being capable of taking the crush of the core print. Remedy—increase the plasticity of the sand.

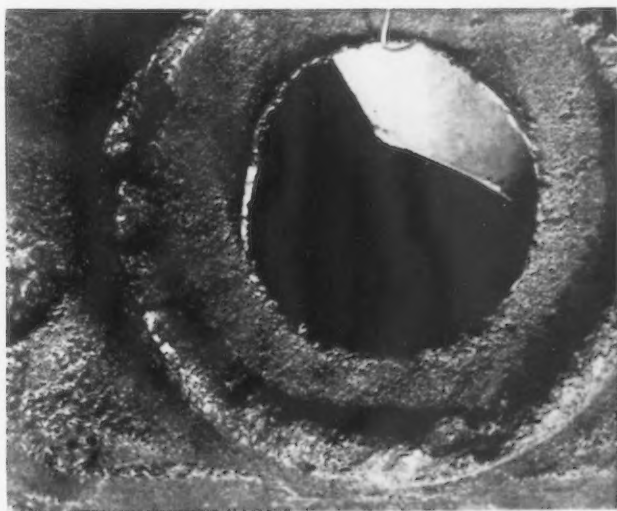


Fig. 14—Gas explosions in mold loosen sand on surface of the mold which dropped into the drag of the mold causing surface of casting to be pitted.

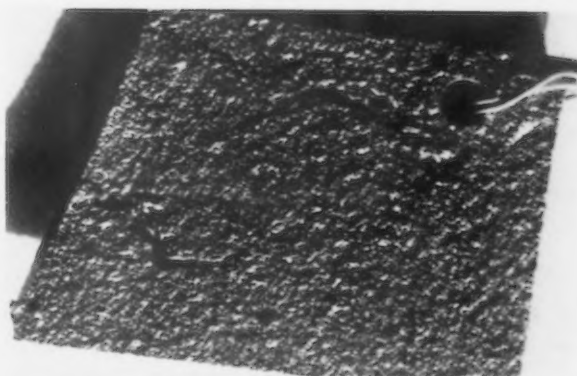


Fig. 15—The dry sand core side of a casting showing a gas seam defect caused by having the core sand too coarse, allowing gas to escape too suddenly into the mold cavity.

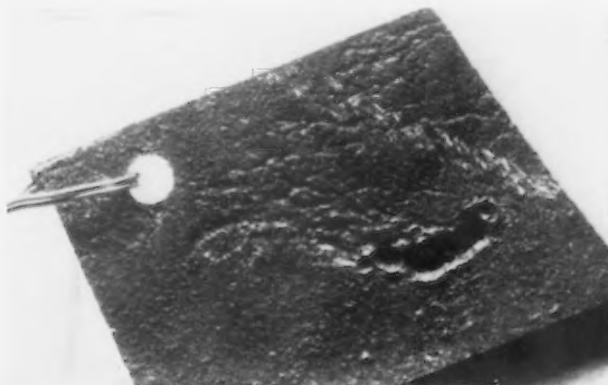


Fig. 16—The green sand side of the casting shown in Fig. 15. Molten metal has eroded the green sand surface of the mold, due to agitation caused by the dry sand core.

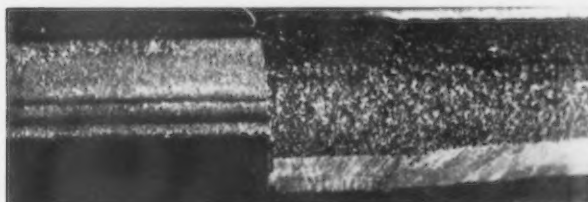


Fig. 17—A combination of core rising between chaplet supports and core washing, caused by a weak core due to frozen sand lumps and poor mixing.



Fig. 18—Green sand side of a casting showing depressions on casting surface, due to core sand washed from the dry sand core, which was improperly baked.

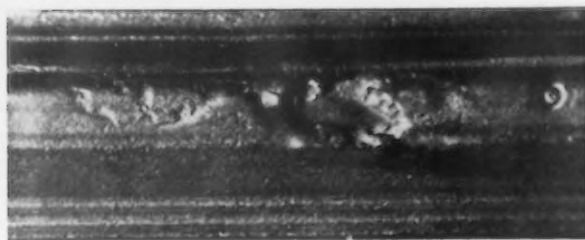


Fig. 19—The effect of hard ramming and excessive moisture on a sand which had low permeability. Note needles on blow section showing wet sand and the surface where metal could not lie firmly on the sand surface.

defective casting brought about by low, dry sand strength is illustrated in Fig. 12.

A drop defect, easily distinguishable, is shown in Fig. 13. The sand was not plastic enough to take the crush of the core print. Fig. 14 illustrates the effect of the explosion of a collection of gases as the molten metal entered the mold. The shock loosened

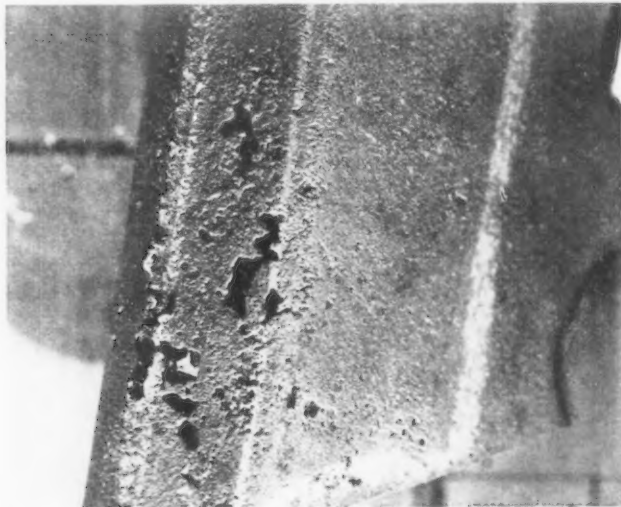


Fig. 20—Casting defect showing molding sand inclusions as dark centers of definite shape around which metal flows. Defect caused by soft ramming around bottom of sprue and space between flask and sprue. The sand broke away from the sprue and was washed by the swift current of iron from the sprue and gate. When the current of metal was reduced, the sand was deposited in the mold. Note that the gate is not washed.

particles of sand. The damage would have been less had the sand been a little more plastic, as measured by the deformation of the sand, a property closely related to strength.

At this point it is interesting to note that the strength of sand is being measured by equipment now on the market. One is a universal sand strength

machine used to test the green and dry sand strengths of molding sand and cores. Another is called the bond meter, which measures the bonding properties of clays and bentonites.

Fineness of sand plays an influential part in the permeability of the green sand or dry sand portion of a mold. In the case of a green sand, the clay content acts in conjunction with the fineness to determine permeability. In silica core sand, however, fineness is the controlling factor. Fig. 15 shows the core side of a gas seam and Fig. 16 the green mold side of a thin casting. Defects of this nature are remedied by using a finer core sand. Open sand vents too freely into the mold space when the core is not baked properly. For castings with $\frac{1}{8}$ -in. metal thickness, the gas content of the core should not be greater than 7 cc. per gram of core burned.

Strength of Baked Cores

The strength test of baked cores offers a means of deciding the causes of core breakage, washing of cores, ease of shaking out and core raises. Fig. 17 is an illustration of a core raise due to a weak core, which in turn resulted from poor mixing of frozen sand. Casting defects caused by poorly baked cores are high. Such cores do not have sufficient strength or rigidity to remain in place between the chaplet supports. A core wash, traced to a poorly baked core, is seen in Fig. 18. The holes on the face of this casting are due to core sand.

The hardness of ramming of molds demands daily attention in order to maintain a desirable standard. Fig. 19 reveals a defect caused by a combination of hard ramming and excessive moisture on a sand which possessed a low permeability for this particular casting. The other extreme is evident in Fig. 20. Here the mold was rammed soft back of the sprue and at the side of the flask, causing a small bottom end of the sprue to break and wash into the mold near the gate.

Fatigue Stresses in Rolling Mill Rolls

A PAPER by Prof. Frederic Bacon of the University College of Swansea, read last November before the South Wales Institute of Engineers, and reprinted in a pamphlet of 112 pages with a number of illustrations, deals with the breakage of rolls, based particularly upon fatigue stresses. It followed a paper read by J. S. Caswell, in which the stress and strain to which sheet mill and tin mill rolls are subjected received extended attention.

Professor Bacon's paper concludes that the behavior of rolls is inextricably interwoven with the term "fatigue" as employed in the strength of materials. He believes that, when freshly fractured faces of a broken roll show hair-crack markings, the fracture is one of fatigue. The factor of safety against fatigue, brought about by loading stresses

only, is small when one considers the numerous adverse contingencies involved.

Most roll fractures showing hair-crack markings are believed to have had the hair-cracks initiated from causes other than, or additional to, the repeated cycles of normal working stresses. In a new roll the outer surface of the chill is called upon to carry the greatest stress and about 18,000 lb. to the square inch is suggested as the provisional estimate for fatigue limits.

Available experimental evidence suggests that the temperature at which the rolls work is not high enough to impair seriously the tensile and fatigue strength of the roll core. Nothing definite appears to be known, however, about the mechanical properties of the chill and mottle at these high temperatures.

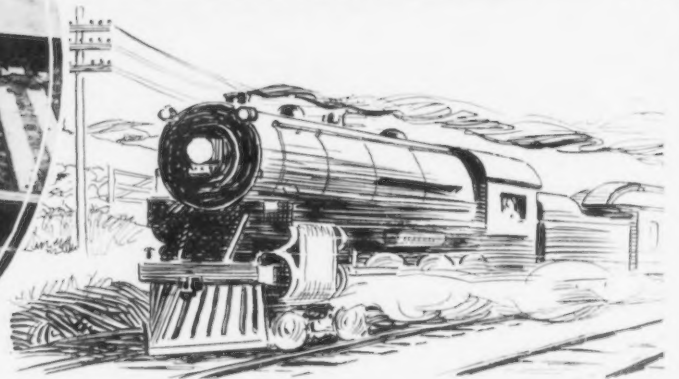
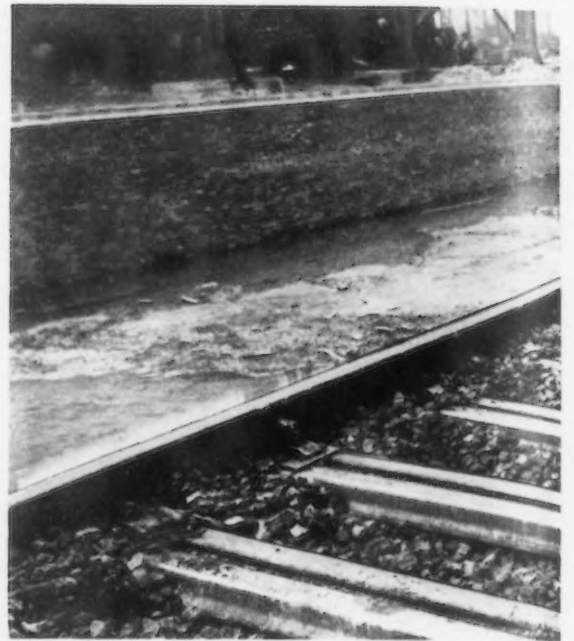
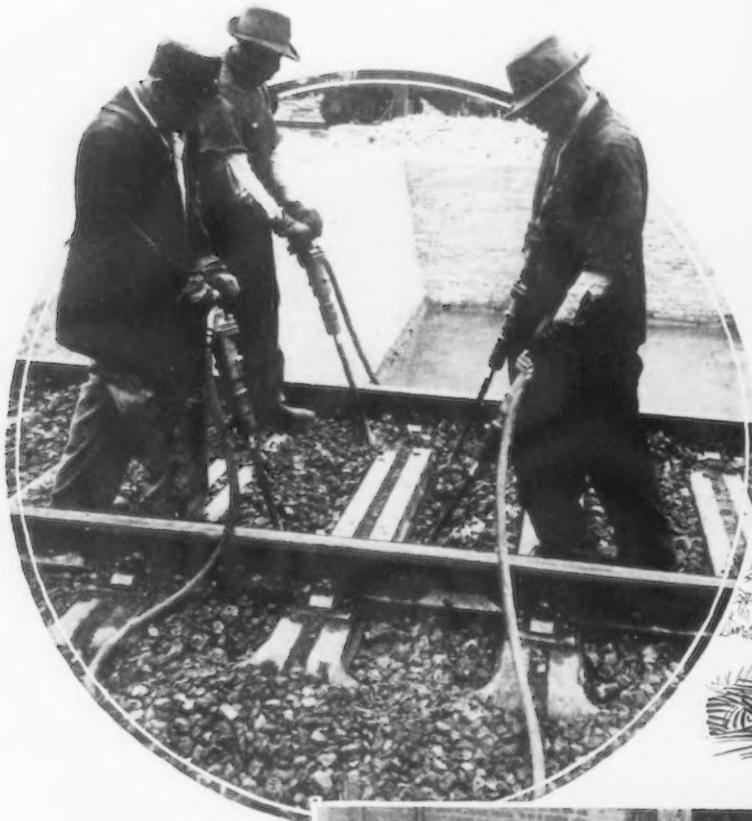


MODERN MAGIC! Imagine the surprise of a foundryman of 50 years ago, if he could come back to earth today. And perhaps what would astonish him most would be to see huge risers, like these, cleanly and quickly cut from a casting by means of a flame. What a job this would be for a hacksaw!

STEEL RAILROAD TIES—A

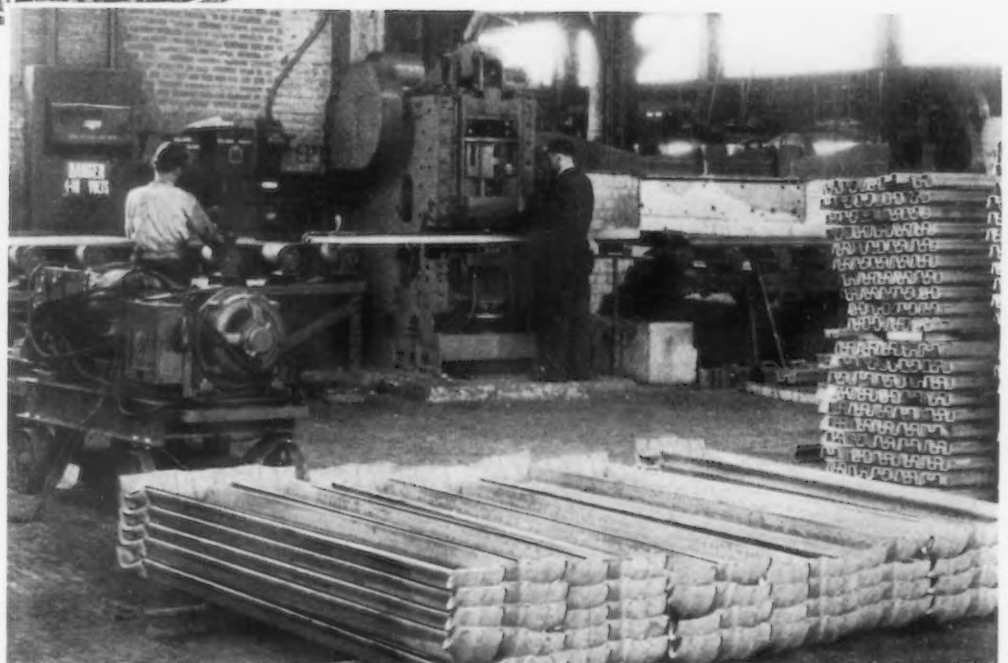
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To determine how thoroughly the metal tie could be tamped, a section of experimental track was laid and pneumatic tampers were used

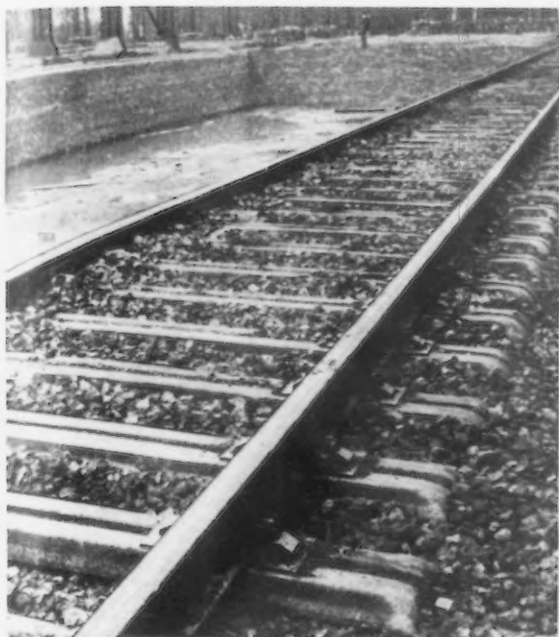


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LONG sections are rolled with side flanges and a channel through the center of copper-bearing steel, so that the tie is 5/16 in. thick in the top and shoulders, widening at the base to 11/16 in. In the photograph, sections of the requisite length are having tie plates welded to each end. These plates are slotted crosswise to provide a seat for the locking lug of the rail clip, preventing shifting of the clip and side movement of the rail, and are slotted lengthwise to permit easy insertion of the bolt. Completed ties (foreground) have had the ends depressed into "whale-tails."

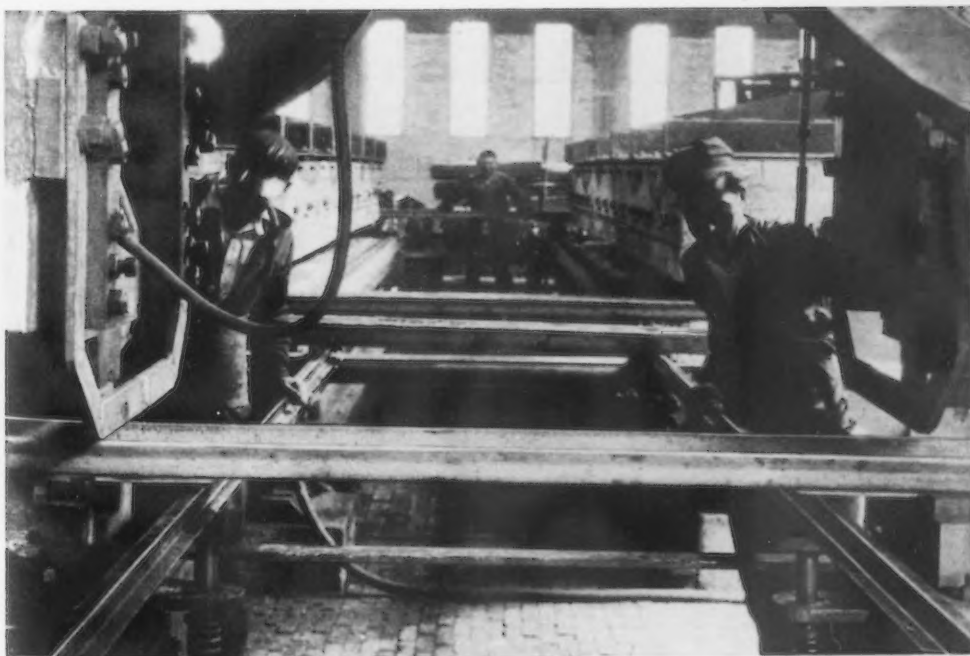
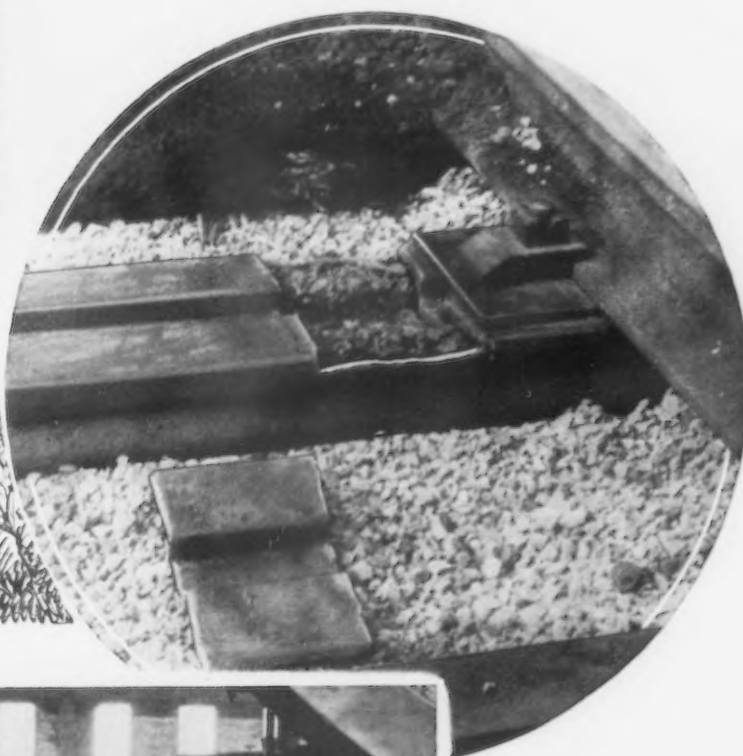


A GROWING OUTLET FOR STEEL



ADVANCES in the use of steel railroad ties offer the prospect of an expanding market for steel. With about 428,000 miles of standard-gage track laid on main lines, sidings and yards in the United States, even a moderate use of steel ties by the railroads would call for large tonnages.

Steel ties have been increasingly used in narrow-gage industrial trackage for some years, but only recently have standard-gage railroads begun to adopt the metal tie on sidings and for turnouts. About two years ago the Bethlehem Steel Co. began manufacture of the "Keystone" metal tie for narrow-gage track, and more recently for sidings on standard-gage railroads.



ABOVE, a section cut from the top of a steel tie after tamping, which disclosed the ballast thoroughly embedded in the hollow underneath, completely filling it. (Left) Large double-purpose press about to depress and flare the ends of a tie into a rounded shoulder termed a "whale-tail," intended as a grip to the roadbed, so that lateral shifting of the track is prevented.

RESISTANCE WELDING AND REPAIR AS

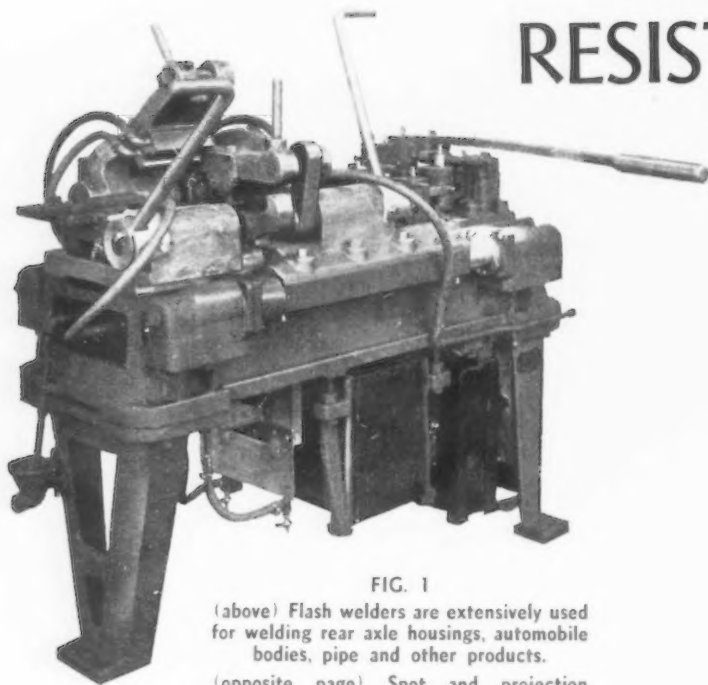


FIG. 1

(above) Flash welders are extensively used for welding rear axle housings, automobile bodies, pipe and other products.

(opposite page) Spot and projection welder.

By M. L. ECKMAN

Research engineer, Federal Machine & Welder Co.
Warren, Ohio

ORIGINATING in 1885, some 45 years ago, electric resistance welding has developed in various forms, such as butt, flash, spot, projection and seam, and has found increasing application in the metal-working industries. It is a simple process, embodied in a machine designed to hold the work, conduct electric current to the welding zone and apply mechanically the correct pressures at the right time. It applies electric energy in a very direct manner, and does its work simply and at high speed.

In the assembling of metal parts, this type of welding has established itself as a valuable ally in keeping costs down and quality high. In common with many other processes, electric resistance welding yields biggest profits in repetitive work, but it cannot be too strongly emphasized that its economical application is by no means limited to large-lot manufacture. In fact a great many small shops are making profitable use of a single flash welder on general repair and job work, and larger shops are operating as many as 20 such machines for the most part on jobbing and salvage work.

Just as a lathe will take a variety of work within the limits of its chuck or faceplate, so will a resistance welder handle pieces of various shapes and sizes. Rounds from $\frac{3}{4}$ to 2 in., or their equivalent in square, flat, structural or special shapes, may be handled on the same welder with no more inconvenience than chucking pieces of irregular shape on a lathe. Here the comparison ends, however, for it may take 5 min. to chuck and true a piece in a lathe and an hour to do the work, whereas if it takes 5 min. to chuck the piece in a welder, it may not take more than 6 to 12 sec. to do the work.

Before describing actual jobbing and production

applications, particularly of flash welders, it may be well to note briefly the different forms of resistance welding and welding machines.

Butt welding, which was the original method of making a resistance weld, involves clamping in suitable jaws two pieces of very nearly the same cross-sectional area, bringing them tightly together and allowing current to flow across this joint until the metal has heated sufficiently to be pushed together and fuse into a weld.

This procedure, while employed economically in many cases, gave rise to much dissatisfaction with welding because the pieces had to be cut fairly square and accurately, and it was generally considered that this material had to be of very low carbon steel. As a matter of fact there were many failures of this type of weld on account of oxide between the surfaces, and irregularities at the juncture of the weld; also the upsetting was very large and heavy and had to be removed at considerable expense.

Of late years the development of flash-type welding has given a higher quality weld, using less than 50 per cent of the current former butt weld and has speeded up the process several hundred per cent. In the flash weld the pieces are brought very slowly toward each other until they are so close that a violent arcing occurs, throwing out volumes of sparks in a spectacular manner and actually burning away part of each piece of metal as fuel for heating subsequent zones of metal to the correct welding temperature. When sufficient heat has been absorbed by the metal, the machine automatically upsets or pushes the pieces together very rapidly. In addition to more rapid operation and less current consumption, this type of welding protects the weld from oxidation.

NG APPLICABLE TO JOBBING AS WELL AS TO PRODUCTION

▲ ▲ ▲

MORE frequently than not, electrical resistance welding is associated with mass production uses. The process has proved markedly economical, however, in small-lot manufacture, jobbing and repair work, the same machine being readily changed over for different sizes, shapes, and even kinds of work. In addition, electric resistance welders are being used for operations other than welding, and these applications, although not regular, serve further to substantiate the main thesis of this article, namely, the versatility of the electric resistance welder.

▼ ▼ ▼

Only in the hand type of flash welding is the material first butted together and then separated to draw the arc. In most mechanically driven machines the pieces are caused to approach each other gradually, thus starting the arcing in a uniform manner. In this way contacting of the pieces before the arc starts is unnecessary. Flash welding is at present extensively employed for assembling automobile rear axle housings, automobile bodies, barrels, pipe and many other products. A machine designed for this type of welding is shown in Fig. 1.

In spot welding, done by the machine shown in Fig. 2, the sheets or strip are welded in spots by pressing together between electrodes of suitable shape; resistance of the metal to electric current generates intense heat, and pressure completes the weld. A variation of spot welding is the projection method, for which the machine pictured in Fig. 2 is also suitable. In this, preformed raised ridges or points serve to localize the current. In seam welding, sheets, strip or plate are passed between electrode rollers or current-carrying dies, which with suitable mechanical pressure produces a welded

seam—in reality, overlapping spot welds. A machine for this work is shown in Fig. 3.

Resistance Welding Applied to Small Tools and Machine Parts

Although electrical resistance welding is employed extensively in the manufacture of automobile, radio, electric refrigerator, metal furniture, farm implement and a wide variety of other parts, the following examples from the small tool, machine parts and general hardware fields illustrate use of the process in repair as well as in production work.

Twist drills, such as shown in Fig. 4, are usually made up of a high-speed steel body welded to a mild steel shank, about 95 per cent of all high-speed drills being manufactured in this manner. In heavy-duty drilling the body and shank are frequently twisted off, and in shops using a large number of drills, reclamation of these broken tools is an important source of economy. In reclaiming these drills, it is but a few minutes' work to take a round piece of steel as shown by the heavy lines in the

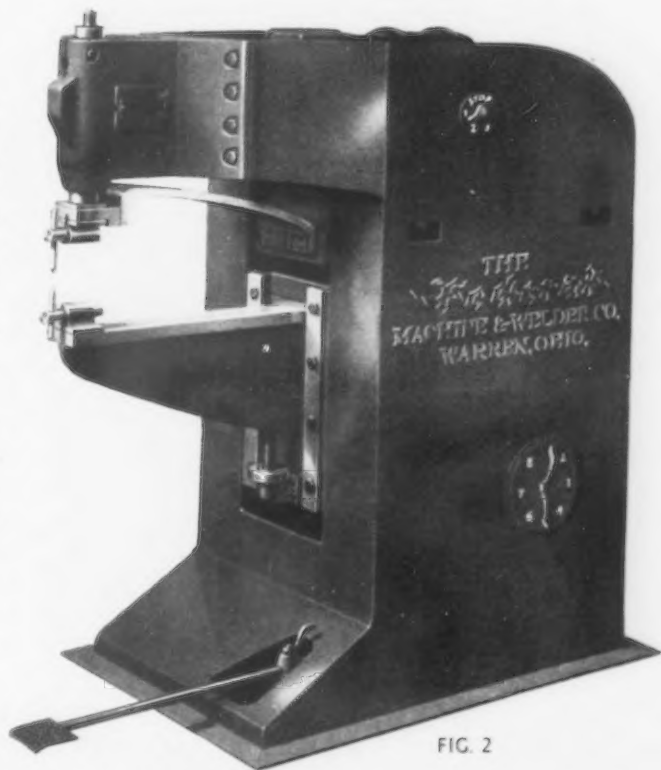


FIG. 2

lower illustration, Fig. 4, turn a small neck on the steel and weld as indicated. The shank is then re-machined as shown by the dotted lines.

Extension shanks of any length can be made on drills for deep-hole work, and, likewise, taps can be lengthened any desired amount. Reamers are also manufactured, repaired or lengthened in the same manner as the twist drills. In the manufacture of broaches of all types—push, pull, round, or square, splined keyed, irregular or the formed type used for finishing small parts—resistance welding is usually employed. In this case also, mild steel shanks are welded to the high-speed steel cutting body as indicated in Fig. 5.

All Steels Can Be Welded

In discussing the application of welding to small tools it should be pointed out in passing that, with a study of conditions, virtually all commercial alloy steels can be welded. However, a steel that will air harden on being removed from a heat-treating furnace will become brittle after electric welding. This brittleness is not due to any mysterious effect that an electric current has upon steel; it is due to the fact that the electric heat is quite local and the cold steel adjacent to the weld acts as a chill. The extreme brittleness in such close proximity to the weld has given rise to the belief that the weld is defective, and has led to the assertion that only the mild steels can be welded practically. Ample proof is at hand that with some little study of conditions virtually all steels can be welded.

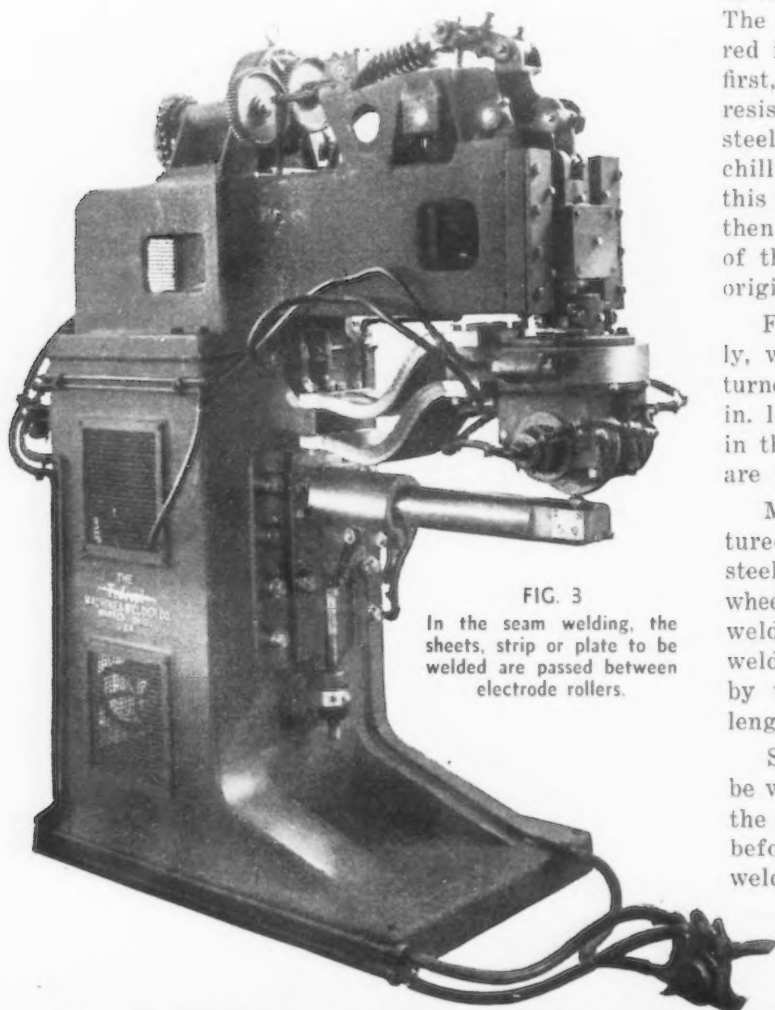


FIG. 3

In the seam welding, the sheets, strip or plate to be welded are passed between electrode rollers.

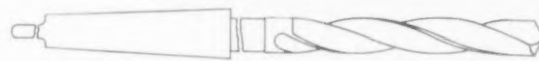


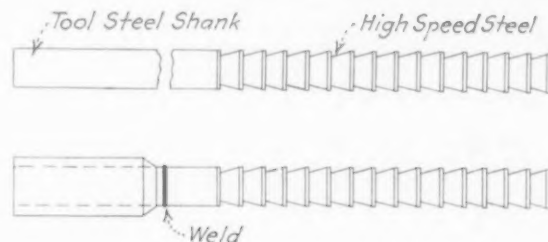
FIG. 4

Twist drills with the shank or tang twisted off may be repaired as shown.



FIG. 5

Broaches are also repaired by resistance welding and subsequent machining of the shank.



Equipped with a flash welder, a lead pot for heating to 1500 deg. Fahr. and a mica box containing flake mica, the procedure for welding high-speed to mild steel is as follows: The piece of high-speed steel is annealed, for a distance of 1½ to 2 in. from the point where the joint is to be made, by heating in the lead pot and then cooling in the mica box. The mild steel shank is then preheated to a dull red in the lead pot. This preheating is necessary, first, because high-speed steel has greater electrical resistance and heats faster; second, so that the mild steel in forming a reservoir of heat will prevent chilling of the high-speed steel after welding. With this preparation, the pieces of steel are welded and then placed in the mica box to cool. The strength of the weld thus produced is equal to that of the original metal.

Fig. 6 shows a drill press spindle, which, formerly, we made from forgings, and before that were turned out of solid stock. We now take stock 1/16 in. larger than finished size and weld as indicated in the illustration. From 75 to 125 welds an hour are possible.

Milling machine arbors, Fig. 7, are also manufactured or repaired by resistance welding, and forged steel machine handles are joined to levers and handwheels of all kinds. Machine head gib forgings are welded to taper gibs of varying lengths, 200 or more welds an hour being obtainable. Eyebolts are made by welding the eye, a standard forging, to any length of bolt.

Speed wrenches, such as shown in Fig. 8, may be welded to the brace. The illustration also shows the method of upsetting the handle of a T-wrench before welding, this upsetting being also done on a welding machine. Welding of screw drivers on to mild steel handles is accomplished at the rate of 250 welds an hour. Claw hammers are manufactured by welding tool-steel heads and claws

to mild steel bodies, and hammers with worn-out serrations or chipped heads may be repaired.

Hatchets are now produced in quantities by means of welding, tool steel bits being joined to mild steel bodies, as shown in Fig. 9. Axes are manufactured in the same way, and salvage departments in large manufacturing plants rework many tools by welding.

An unusual application of resistance welding is the joining of two twisted copper cables, Fig. 10, to the mild steel terminal pieces used for bonding electric railway tracks. The strength of the weld is such that the cable will part under tensile pull before the weld will break. This work is done at the rate of 400 welds of two strands to one terminal per hour.

Worn pulley fits and keyways may be replaced by welding new ends to the shafts as shown in the motor armature, Fig. 11. Worn bearings may be replaced as well, with the elimination of costly production delays. It requires about 15 min. to set up

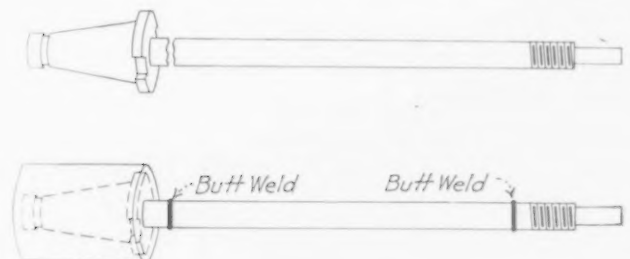


FIG. 6

Drill press spindles may be manufactured, or either end repaired, as indicated.

FIG. 7

Welding is also applied economically to milling machine arbors. Butt welding the large end eliminates making the arbor from a forging.



an armature and make the weld, whereas if the shaft were pressed out and replaced considerably more time would be consumed.

Resistance Welders Applied to Forging, Bending and Heat Treating

The versatility of electric resistance welding machines is reflected further in their use in many special operations, such as forging, bending, annealing and hardening. Where the quantity and variety of work does not warrant use of a standard forging machine, a resistance welder may be employed to upset collars of various sizes on shafts and pins. Even hot heading of bolts is done, and it has been found that some types of forge work can be heated by electrical resistance at 15 per cent the cost of oil or electric furnaces.

An electric locomotive builder uses a resistance welder for bending pipe. A machine is mounted beside each locomotive and the pipe heated and bent

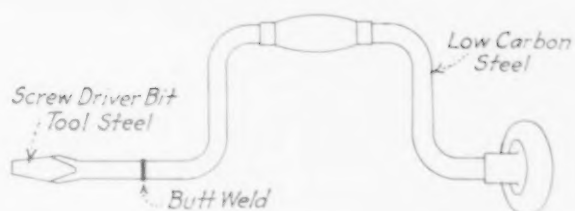
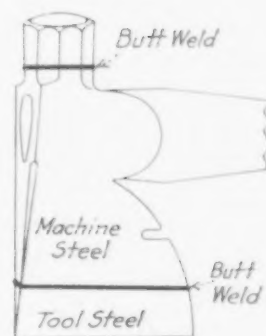


FIG. 8

Speed wrench made by butt welding screw driver bit to brace. The upsetting as well as the joining of such bits, as at the left, is also done on the welder.

FIG. 9

Hatchets, axes and claw hammers are other products welded to advantage.



as needed. This method is very rapid, 1 to 3-in. pipe being heated in 3 to 8 sec. Resistance welding machines are also used extensively in fabricating shops in bending structural shapes.

Localized annealing of jigs, fixtures and dies has been done successfully, the jig or other piece being annealed in certain local spots or areas in order to better resist shock or to facilitate further machining.

Heating of pieces of uniform shape for hardening has also been successfully developed; in this application the welder is not only rapid, but performs the operation at low cost. The uniform temperature obtained in each piece is noteworthy. The machine for this work is designed so that the electric current is shut off as soon as the piece being heated has

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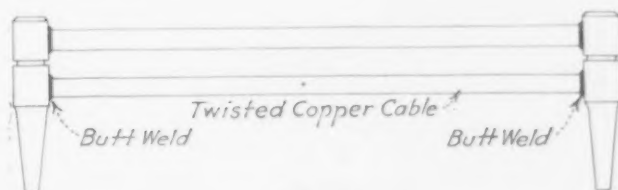
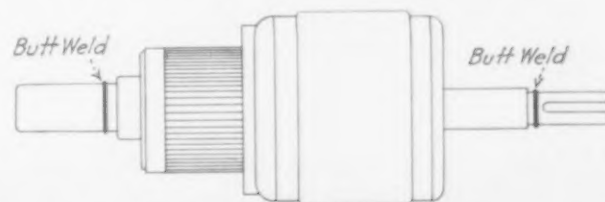


FIG. 10

Joining of bonding cables for electric railway track is an unusual application of resistance welding.

FIG. 11

Motor armature shaft ends repaired economically by butt welding.



UNIFORM HOT-BLAST TEMPERATURES AUTOMATICALLY MAINTAINED

AN important factor in the production of blast furnace products from the triple viewpoint of quality, quantity per cast, and cost is the temperature of the hot blast. After leaving the blowing engines and before coming to the furnaces, the air is heated to temperatures ranging from 800 to 1800 deg. F. by means of hot-blast stoves, each furnace being connected with four stoves. While one of the four stoves is heating the blast, the other three are in the preparation stage.

Wide variations in temperature incident to the changing of the stoves, the pouring of a cast, and other factors affect the quality and quantity of the product. Other factors contributing to efficient furnace operation and which are reduced or eliminated when a uniform hot-blast temperature is maintained are tuyere burnouts due to abnormal temperatures, excessive furnace pressures, the see-sawing of temperatures when furnace conditions are unbalanced after casting, the life of the furnace lining, and the harmful effect of strains and stresses in the furnace

produced by violent heat fluctuation.

Basically, the way to control the temperature of the blast and thus keep it uniform is to install the thermocouple of a pyrometer in the hot-blast main near the bustle pipe and to actuate controlling valves in accordance with the movement of the pyrometer pointer. A system for doing this has been worked out by the Bristol Co., Waterbury, Conn., and tested in actual use. With this system, the control is accomplished by the regulation of a cooling blast, as indicated in Fig. 1. (Fig. 6 is a photograph showing this valve with motor mounted on it.)

This is effected by means of a mixer valve operator, B, through the pyrometer, F, as hereafter explained. The motor-operated valve is located in a cold air pipe and, as the hot air is passed through the stoves to the hot-blast main, the cold air is admitted through this mixing valve as needed to hold the temperature at the desired value.

Variables in Successful Control

There are a number of variables encountered in the successful control

of the temperature, among which are the following:

1. As the cutting-in of the stoves is at the discretion of the operator, fresh stoves may come in on the main at widely differing temperatures and at more or less irregular time intervals.
2. Many blast furnaces do not have all stoves with equal heating surfaces or equal heat storage capacity. This affects the temperature of the stoves, as well as their rates of cooling.
3. It is frequently necessary to change the burden of the furnace and the volume of air from the blowing engines.
4. During back-drafting following the cast period, the temperature inside the bustle pipe rises, due to the wind being off the furnace.
5. At the time of cutting in a new stove the temperature of the blast tends to rise very rapidly; while, as the stove cools, the temperature falls off much more slowly, but not uniformly.

It is obvious that, to obtain full automatic regulation, the hot-blast controller must be provided with adjustments sufficient to meet all these varying conditions. To effect the desired control, it has been found necessary to operate the valve at different speeds, depending on the extent of the temperature deviations. This system is known as a multi-speed system.

Effect of a Multi-Speed System

The reason for this is apparent when one considers what the cycle of events would be, if a one-speed system were used. In this case, there would be a tendency for the regulation to become uncertain right after making a cast, or stove change. When the wind is taken off, to make it possible to plug the furnace after a cast, the temperature immediately rises, because the mixing valve is kept closed during this period. Then, when the wind is put on again, the natural tendency is to admit all the cold air available through the valve. If the stove being used at this time is not fairly hot, the sudden rush of

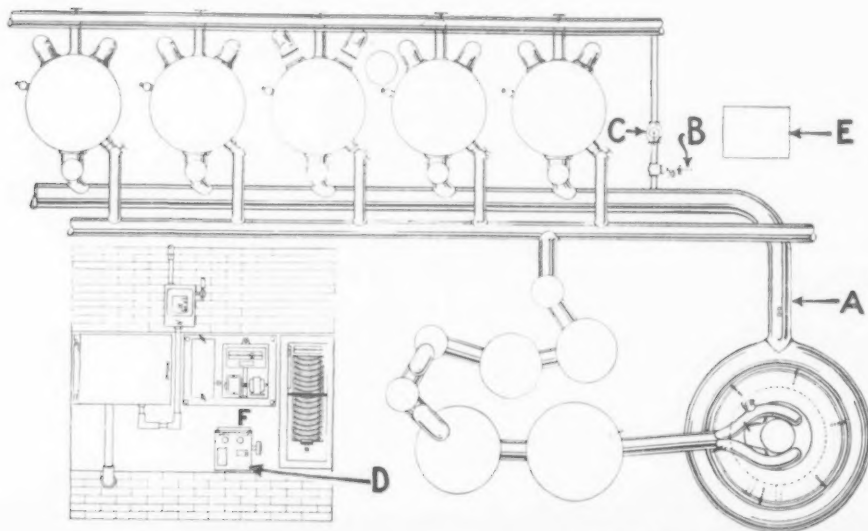


Fig. 1—Assembly view of automatic system for hot-blast control.

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EXTREME variations in the temperatures of the hot-blast stoves at blast furnaces are often caused when changing from one stove to another. Such variations react on the quality, quantity and cost of the furnace product. A uniform hot-blast temperature is pointed to as a cure for many current evils.

This article describes what is claimed to be an effective system for maintaining uniform temperatures of the hot blast. A pyrometer installed in the hot-blast main, actuated by controlling valves in accordance with the movement of the pyrometer pointer, has been found in practical use at various blast furnaces to accomplish the desired end, it is stated.

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cold air soon cools off the back heat. The temperature in the bustle pipe then falls, and the valve runs to the closed position, probably spoiling regulation until a new stove is put on the line and conditions stabilized.

This action, known as hunting, is illustrated in Fig. 2.

Such conditions as those outlined are avoided by the multi-speed system, it is stated, wherein the velocity of the valve is governed by the use

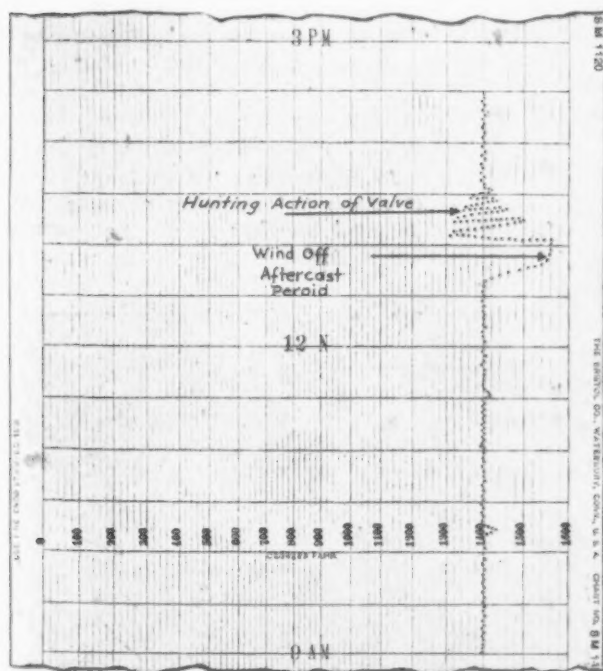


Fig. 2—Hunting action illustrated graphically in its effect on temperatures.

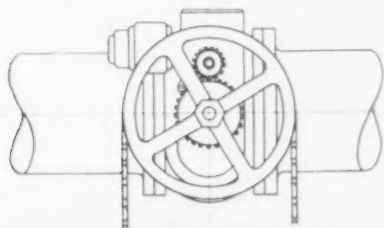


Fig. 3—The valve operator.

of an interrupter, when the temperature deviations are small, and the interrupter is cut out of action for wide deflections of the pointer of the control instrument. The interrupted action is also eliminated at all points of the scale when sudden and extreme changes of temperature take place.

The valve operator, Fig. 3, consists of a motor unit assembled to an auxiliary gear reduction unit, designed so that each unit will fit the needs and requirements of the individual style, type and size of valve to which it is to be applied.

Mixing Valve Operated by a Motor

A motor is used for operating the mixing valve, which can usually be installed directly on the pipe line, and always in the immediate vicinity of the valve without the need of long cables or chains for operating the latter. It is in engagement with the valve mechanism only when power is actually applied to the motor, and thus does not in any way interfere with the operation of the valve by means of the hand wheel whenever such is necessary. The gear-reducing mechanism is made to suit conditions of operation as encountered in blast furnaces. The gear ratio between the valve and the operating mechanism is such that the maximum speed of valve travel is 12 in. per

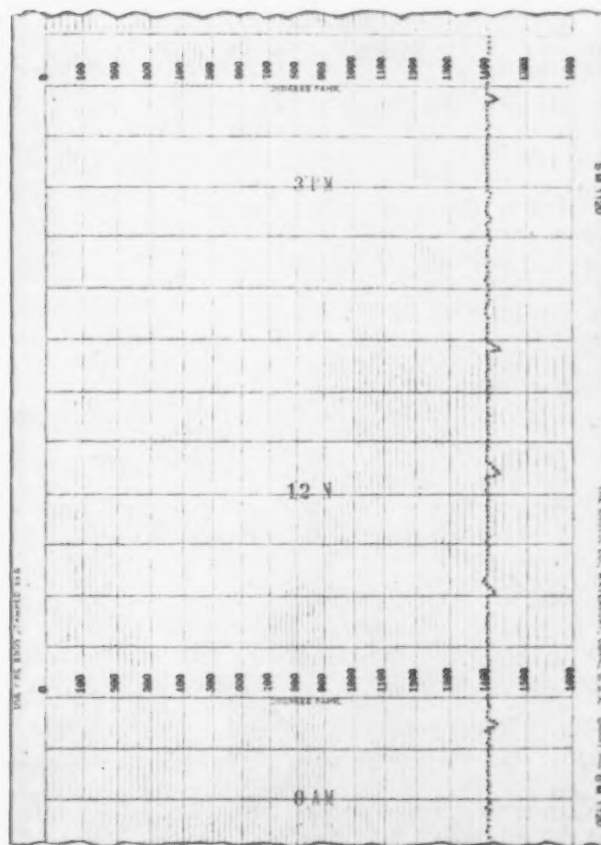


Fig. 4—Effect of the valve operator in minimizing high-temperature peaks.

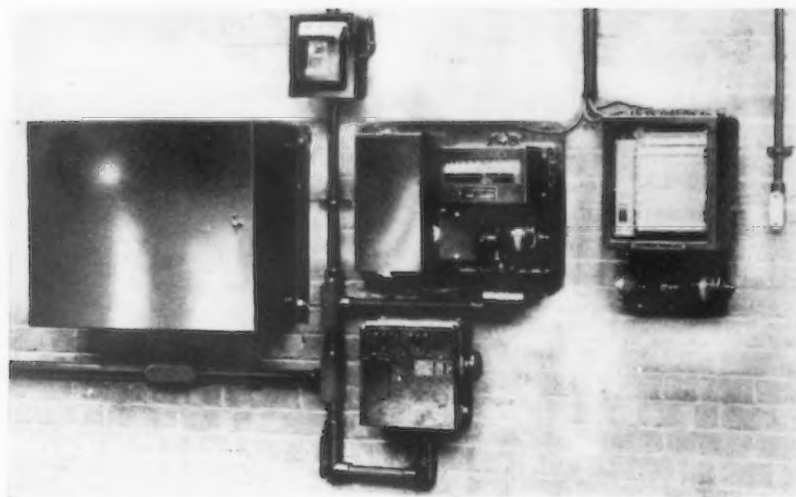


Fig. 5—Assembly of relay panel, pyrometer controller, relays, switches, recording pyrometer and the manual stations.

min. The valve operator is equipped with limit switches which stop the motor when the valve is at either extreme of its travel. This prevents jamming of the valve or operating mechanism.

This operator is actuated normally through a simple relay system from the pyrometer controller, using a direct-deflection, high-resistance, millivoltmeter movement. The thermocouple is of the bare type, and is installed in the bustle pipe at A in Fig. 1, and connected directly to the control instrument. The pyrometer is equipped with an automatic cold-end compensator.

In the controller the switch is provided with a neutral zone and, when the indicating pointer is within this zone, no action of the valve mechanism takes place. As the pointer deflects slightly to one side or the other of this zone, in response to temperature changes, the proper relays are actuated to put the valve motor into operation in such a direction as to correct the change which has taken place. If the temperature change is relatively slight, the interrupter, contained in a box on the left of the control instrument, prevents continuous operation and gives an inching action, which results in the equivalent of a slow-speed opening or closing of the valve.

Hunting and See-sawing of Temperatures Eliminated

This eliminates hunting and see-sawing of temperatures. The interrupter is adjustable through a wide range, as conditions may demand. The most satisfactory results have been obtained with a setting in which the equivalent slow speed is approximately one-quarter the maximum speed of the valve travel.

Under normal operating conditions, during gradual cooling of the stove, the inching action takes place as described above. When a fresh stove is put on the line, however, this inching action is suspended, and the valve runs at its full speed of 12 in. per min. until fully open, and the maximum amount of cold air is admitted. This has the effect of minimizing high temperature peaks, as shown by the chart in Fig. 4. Without this automatic interrupter cut-out, such peaks can be reduced only by the assistance of hand control. A study of the chart shows the good feature of having this rapid travel at the times of stove change.

The temperature setting of the controller is readily adjusted by setting

the position of the pyrometer switch. This is done by a knurled knob at the base of the instrument, and the actual temperature setting is shown by an index or spotter on the same scale with the indicating pointer of the pyrometer. The measuring circuit is entirely independent of any other electrical circuits used in the control system.

Thus, in case of a complete failure of the electric power used to operate the control valves, etc., the instrument continues to indicate on its scale the true temperature in the hot-blast main. The indication of these temperatures together with the manual operation of the control valves provided, makes possible uninterrupted temperature control. The indicating scale on the instrument is 7 in. long, wide open, and is easy to read.

This construction is helpful where automatic control is not in use, and is convenient during automatic control operation. The instrument switch, which actuates the control relays, effects its purpose without imposing harmful strains on the instrument movement; and the contacts are not at any time required to break an electrical circuit. The position of this switch can be changed with regard to the instrument scale so as to correspond to the temperature which it is required to control. An index or spotter is incorporated which makes it very easy for the operator to determine normal temperature settings.

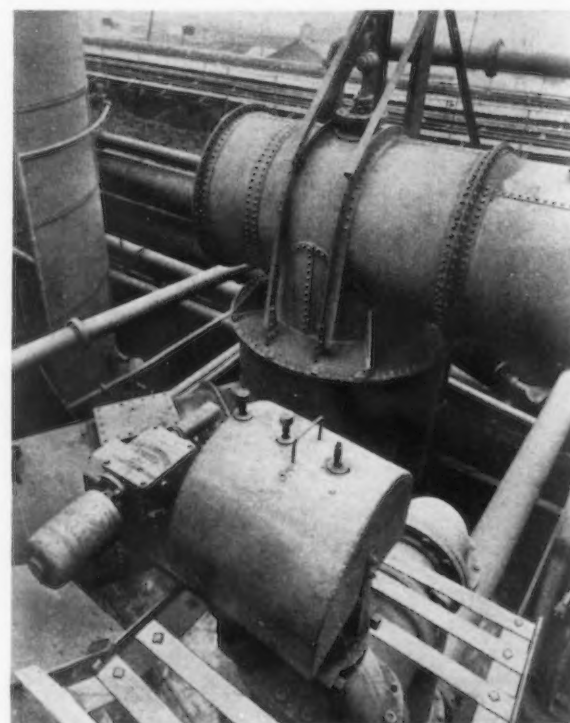
As shown in an illustration, the instrument and auxiliary contacts are mounted together on a metal panel. The main contactors and relays are

▲ ▲ ▲

Fig. 6

Typical installation of temperature control apparatus on a blast furnace of Woodward Iron Co.

▼ ▼ ▼



mounted on a slate panel and inclosed in a substantial metal case with door, which can be locked. In most instances, a fairly high voltage is required for operation of the motor, and this closed cabinet is a desirable precaution against the possibility of the operator coming in contact with live parts. If necessary, it can be installed at a distance from either the controller instrument or manual electric station. An assembly of the relay panel, pyrometer controller, relays, switches, recording pyrometer, together with the manual station, is shown in Fig. 5.

Directly beneath the pyrometer controller is installed the manual electric station, which enables manual control to be superimposed upon the automatic. By a handle on this station, it is possible at any time to operate the valve motor, irrespective of the indication of the pyrometer. Once the handle is turned, a no-voltage release holds the handle in the operating position so that, unless it is reset to the middle position, the valve will travel to its limit, at which time the system automatically reverts to pyrometer control.

As the manual station takes predominance over the automatic, there is never any interference in operation and, in case of emergency, the manual station may at any time be used to open or close the valve without disturbing the action of the pyrometer. The manual station also includes red and green signal lights which serve to indicate the position of the valve in its travel. With the valve at either limit, one or the other of the lights is extinguished, while in the intermediate positions both lights are illuminated.

System Installed at Several Plants

This system, as described, has already been successfully installed in plants of the Woodward Iron Co., Birmingham; at Gary; Coatesville; Johnstown; Ensley; Buffalo; Detroit and Chicago. The photographs, Figs. 6 and 7, show a typical installation at the Woodward company's furnaces embodying all improvements by means of which full automatic operation without assistance from hand operation is accomplished. This improvement saves much of the stove tender's time and renders him more efficient.

This furnace has an approximate daily capacity of 500 tons. It is heated by a set of five two-pass side-combustion chamber stoves, each stove having approximately 74,000 sq. ft. of heating surface. The cold blast line is 30 in. and the hot blast main 54 in. in diameter. The mixing

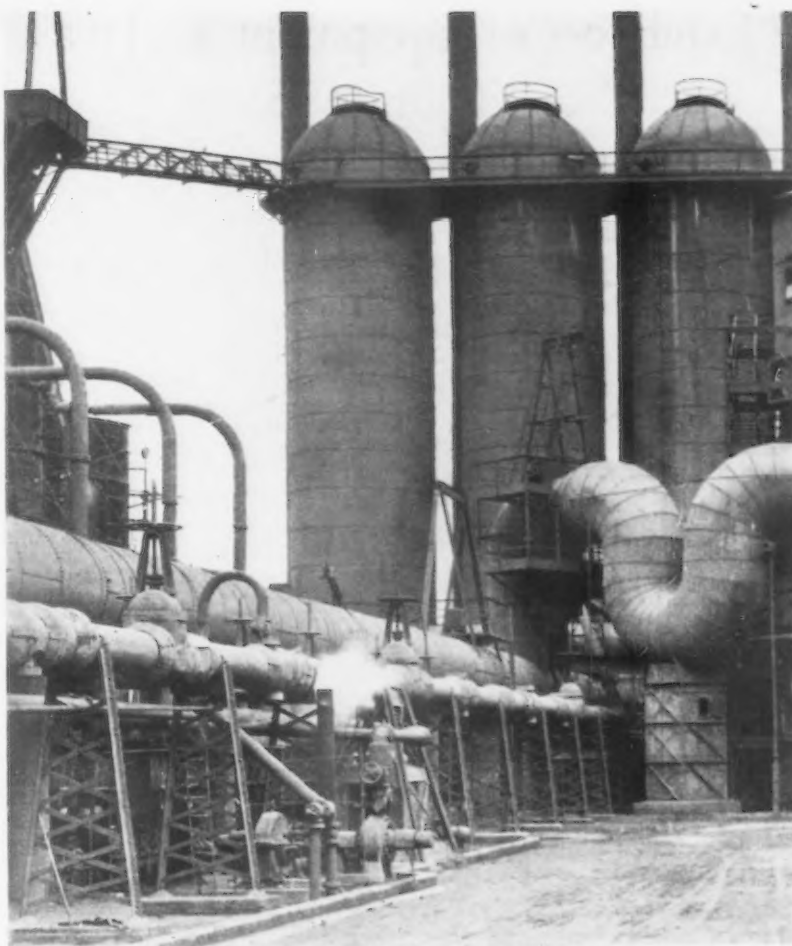


Fig. 7—Installation of Bristol temperature control apparatus at a furnace of the Woodward Iron Co.

line is about 30 ft. long and the location of the valve is such that a splendid mix is obtained. When installing the control, it was not found necessary to change the layout of any part of the furnace. In this installation, the pyrometer controller and its associated relays are located in the pyrometer house, near the furnace, where the stove tender makes his headquarters between stove changes and other duties. At this furnace, the temperature of the hot blast is maintained practically constant, as

indicated by the chart shown in Fig. 4. This result was secured by a careful coordination of the control with the characteristics of the furnace upon which it is used.

While the advantages to be derived from the use of the hot-blast temperature control will vary with different furnaces, conditions would have to be extremely unfavorable to be such that careful adjustment of the control to the furnace will not permit the record, produced as shown in Fig. 4, to be duplicated.

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Monel Metal Used for Kitchen Sinks

A kitchen sink of solid Monel metal has been placed on the market in 10 standardized models and sizes ranging from 42 to 72 in. long and equipped with double and single drainboards. A feature of the sink is its one-piece construction, achieved by stamping it from sheet metal on large presses used in the manufacture of automobile bodies.

The sink is designed with flowing curves at all corners eliminating cracks and crevices for dirt and is formed of No. 16 gage sheets, rein-

forced with braces, sound deadened.

Another feature of the sink is its saving of space. The usual roll around the apron, ranging up to 2 1/4 in. in diameter and the curved edge between drainboards and sink bowl have been reduced to 1/2 in. It has a silvery satin finish intended to harmonize with any of the bright color schemes at present so popular, and is recommended by the maker as resistant to rust and ordinary food acids, and easily cleaned, facilitating maintenance of its original appearance.

Exhibitors of Equipment at This Year's Foundry Show

ALIMITED exhibition of foundry equipment is scheduled for the thirty-fifth annual exhibit of the American Foundrymen's Association in Chicago, May 4 to 7. In recent years it has been the policy of the board of directors to hold a large exhibition only every other year. The last one of this nature was held in the

Public Auditorium, Cleveland, last May.

Two years ago a small exhibit was staged in the exhibition hall in the basement of the Hotel Stevens in Chicago. This year's plans include a display about twice the size of the one in 1929 in that the large ball room will also be used. A list of the exhibitors this year follows:

A

ABRASIVE CO., Philadelphia. Booth 74.
ADAMS CO., Dubuque, Iowa. Booth 116.
ADVANCE MILLING CO., Chicago. Booth 37.
AIR-LEC DOOR OPERATORS, Madison, Wis. Booth 270.
AIR REDUCTION SALES CO., New York. Booths 262 and 264.
AJAX ELECTRIC FURNACE CORPN., Philadelphia. Booth 124.
AJAX ELECTROTHERMIC CORPN., Trenton, N. J. Booth 124.
AJAX METAL CO., Philadelphia. Booth 126.
ALBANY SAND & SUPPLY CO., Albany, N. Y. Booth 68.
AMERICAN BRAKE SHOE & FOUNDRY CO., Chicago. Booth 18.
AMERICAN FOUNDRY EQUIPMENT CO., Mishawaka, Ind. Booths 106 and 123.
AMERICAN METAL MARKET, New York. Booth 230.
AMERICAN SOCIETY FOR TESTING MATERIALS, Philadelphia. Booth 265.
APEX SMELTING CO., Chicago. Booth 136.
ARCADE MFG. CO., Freeport, Ill. Booth 112.
ARMSTRONG-BLUM MFG. CO., Chicago. Booth 129.
AUSTIN CO., Cleveland. Booth 134.
AUTOMATIC TRANSPORTATION CO., INC., Chicago. Booth 82.
AYERS MINERAL CO., Zanesville, Ohio. Booth 232.

B

BARTLETT & SNOW CO., C. O., Cleveland. Booths 77 and 79.
BAUMGARDNER MFG. CORPN., H. L., Fremont, Ohio. Booth 49.
BAUSCH & LOMB OPTICAL CO., Rochester, N. Y. Booth 250.
BEARDSLEY & PIPER CO., Chicago. Booths 1, 2, 3 and 4.
BETHLEHEM STEEL CO., Bethlehem, Pa. Booth 86.
BLACK & DECKER MFG. CO., Towson, Md. Booth 62.
BLAW-KNOX CO., Pittsburgh. Booth 29.
BRADLEY WASHFOUNTAIN CO., Milwaukee, Wis. Booth 33.
BRITISH ALUMINUM CO., LTD., New York. Booth 228.

C

CAMPBELL-HAUSFELD CO., Harrison, Ohio. Booth 91.
CARBORUNDUM CO., Niagara Falls, N. Y. Booths 94 and 96.
CARBORUNDUM CO., Refractory Division, Perth Amboy, N. J. Booth 98.
CAROL ENGINEERING, INC., Dayton, Ohio. Booth 253.
CHAIN BELT CO., Milwaukee. Booths 32 and 34.
CHICAGO MFG. & DISTRIBUTING CO., Chicago. Booth 256.

CHISHOLM-MOORE HOIST CORPN., Tonawanda, N. Y. Booth 17.

CLARK TRACTOR CO., Battle Creek, Mich. Booths 61 and 63.

CLEARFIELD MACHINE CO., Clearfield, Pa. Booth 55.

CLIPPER BELT LACER CO., Grand Rapids, Mich. Booth 101.

CORN PRODUCTS REFINING CO., New York. Booth 43.

D

DEMMLER & BROS., WILLIAM, Kewanee, Ill. Booth 52.

DETROIT ELECTRIC FURNACE CO., Detroit. Booth 135.

DIETERT CO., HARRY W., Detroit. Booth 104.

JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J. Booth 88.

E

EASTERN CLAY PRODUCTS, INC., Buffalo. Booth 69.

ELECTRO ALLOYS, INC., Buffalo. Booth 251.

ELECTRO-CHEMICAL PATTERN & MFG. CO., Detroit. Booth 239.

ELECTRIC STORAGE BATTERY CO., Philadelphia. Booth 279.

ELECTRO REFRATORIES CORPN., Buffalo. Booth 251.

EUCLID CRANE & HOIST CO., Euclid, Ohio. Booth 17.

F

FORT PITT STEEL CASTING CO., McKeesport, Pa. Booth 30.

FOUNDRY EQUIPMENT CO., Cleveland. Booth 58.

FOUNDRY SUPPLIES MFG. CO., Chicago. Booths 264 and 266.

G

GALLAND-HENNING MFG. CO., Milwaukee. Booth 26.

GENERAL ELECTRIC CO., Schenectady. Booths 108, 110, 125 and 127.

GENERAL ELECTRIC X-RAY CORPN., Chicago. Booth 216.

GLOBE STEEL ABRASIVE CO., Mansfield, Ohio. Booth 24.

GORDON CO., CLAUDE S., Chicago. Booth 234.

GRAY IRON INSTITUTE, INC., Cleveland. Booth 267.

GREAT LAKES FOUNDRY SAND CO., Detroit. Booth 83.

GREAT WESTERN MFG. CO., Leavenworth, Kan. Booth 132.

GRIFFIN ENGINEERING CO., Chicago. Booth 260.

GRINDLE FUEL EQUIPMENT CO., Harvey, Ill. Booth 120.

H

HARNISCHFEGGER SALES CORPN., Milwaukee. Booth 15.

HERMAN PNEUMATIC MACHINE CO., Pittsburgh. Booth 40.

HESTON & ANDERSON, Fairfield, Iowa. Booth 114.

HINES LUMBER CO., EDWARD, Chicago. Booth 277.

I

ILLINOIS CLAY PRODUCTS CO., Joliet, Ill. Booth 240.

ILLINOIS TESTING LABORATORIES, INC., Chicago. Booth 215.

INDUSTRIAL MINERALS CO., Columbus, Ohio. Booth 209.

INTERNATIONAL MOLDING MACHINE CO., Chicago. Booth 89.

INTERNATIONAL NICKEL CO., INC., New York. Booth 213.

IRON AGE PUBLISHING CO., New York. Booth 236.

J

JOHNSTON & JENNINGS CO., Cleveland. Booth 107.

K

KAWIN CO., CHARLES C., Chicago. Booth 109.

KELLEY-KOETT MFG. CO., INC., Covington, Ky. Booth 231.

KELLOGG & SONS SALES CORPN., SPENCER, Buffalo. Booth 41.

KELLY GRAPHITE MILLS, INC., Stockertown, Pa. Booth 14.

KLING BROS. ENGINEERING WORKS, Chicago. Booth 130.

KNEFLER-BATES CO., Indianapolis. Booth 56.

KRAMER & CO., H., Chicago. Booth 16.

KRAMER ALLOY CORPN., JOHN, Chicago. Booth 243.

KRAUSE MILLING CO., CHARLES A., Milwaukee. Booth 12.

L

LACLEDE CHRISTY CLAY PRODUCTS CO., St. Louis. Booth 102.

LAVA CRUCIBLE CO. OF PITTSBURGH, Pittsburgh. Booth 203.

LAVIN & SONS, R., Chicago. Booth 243.

LEITZ, INC., E., New York. Booth 261.

LINDSAY-McMILLAN CO., Milwaukee. Booth 66.

LINK-BELT CO., Chicago. Booth 38.

LOUDEN MACHINERY CO., Fairfield, Iowa. Booth 226.

M

MACLEOD CO., Cincinnati. Booth 22.

MAEHLER CO., PAUL, Chicago. Booth 121.

McCOLLUM HOIST & MFG. CO., Downers Grove, Ill. Booth 28.

MATHEWS CONVEYER CO., Ellwood City, Pa. Booth 42.

MEEHANITE RESEARCH INSTITUTE, Chicago. Booth 258.

MICHIGAN SMELTING & REFINING CO., Detroit. Booth 100.

MOLINE IRON WORKS, Moline, Ill. Booth 19.

MOLTRUP STEEL PRODUCTS CO., Beaver Falls, Pa. Booth 48.

MONARCH ENGINEERING & MFG. CO., Baltimore. Booth 54.

N

NATIONAL ENGINEERING CO., Chicago. Booth 95.

NATIONAL FOUNDERS ASSOCIATION, Chicago. Booth 255.

NATIONAL SMELTING CO., Cleveland. Booth 6.

NEW HAVEN SAND BLAST CO., New Haven, Conn. Booth 225.

NIAGARA ROLLER BEARING SCREENS, Buffalo. Booth 204.

NIAGARA FALLS SMELTING & REFINING CORPN., Buffalo. Booth 214.

NICHOLLS CO., INC., WILLIAM H.,
Richmond Hill, N. Y. Booths 97 and
99.

NORTHERN ENGINEERING WORKS,
Detroit. Booth 9.

NORTON CO., Worcester, Mass. Booths
23 and 25.

O

ORERMAYER CO., S., Cincinnati. Booth
92.

OLIVER MACHINERY CO., Grand
Rapids, Mich. Booth 71.

OSBORN MFG. CO., Cleveland. Booth
128.

P

PANGBORN CORPN., Hagerstown, Md.
Booths 76 and 78.

PARSONS ENGINEERING CORPN.,
Cleveland. Booth 36.

PENTON PUBLISHING CO., Cleveland.
Booths 210 and 212.

PICKANDS, BROWN & CO., Chicago.
Booth 137.

PITTSBURGH ELECTRIC FURNACE
CORPN., Pittsburgh. Booth 133.

PRODUCTIVE EQUIPMENT CORPN.,
Chicago. Booth 131.

PYROMETER INSTRUMENT CO., New
York. Booth 278.

Q

QUESTION BOX FOR FOUNDRIES,
Cleveland. Booth 218.

R

ROYER FOUNDRY & MACHINE CO.,
Wilkes-Barre, Pa. Booths 113, 115 and
117.

S

SAFETY FIRST SHOE CO., Framingham,
Mass. Booth 227.

SAFETY GRINDING WHEEL & MA-
CHINE CO., Springfield, Ohio. Booth
193.

ST. LOUIS GAS & COKE CORPN., St.
Louis. Booth 69.

SAND PRODUCTS CORPN., Detroit.
Booth 202.

SEMET-SOLVAY CO., New York. Booth
201.

SHEPARD NILES CRANE & HOIST
CORPN., Montour Falls, N. Y. Booths
5 and 7.

SLY MFG. CO., W. W., Cleveland. Booth
99.

SMITH OIL & REFINING CO., Rockford,
Ill. Booth 119.

SMITH CO., WERNER G., Cleveland.
Booth 39.

SPENCER TURBINE CO., Hartford,
Conn. Booth 89.

STANDARD CONVEYOR CO., North St.
Paul, Minn. Booth 235.

STANDARD SAND & MACHINE CO.,
Chicago. Booth 93.

STANDARD SILICA CO., Chicago. Booth
209.

STEELBLAST ABRASIVE CO., Cleveland.
Booth 36.

STERLING WHEELBARROW CO., Mil-
waukee. Booth 72.

STONE PATTERN MOUNT CO., Bloom-
field, N. J. Booth 31.

SUGAR PINE PATTERN LUMBER EX-
HIBIT, California. Booth 47.

SUPERIOR CHARCOAL IRON CO.,
Grand Rapids, Mich. Booth 233.

SUPERIOR FLAKE GRAPHITE CO.,
Chicago. Booth 208.

SWAN-FINCH OIL CORPN., Chicago.
Booth 27.

T

TABOR MFG. CO., Philadelphia. Booths
73 and 75.

TRUSCON STEEL CO., Cleveland. Booth
331.

TYLER CO., W. S., Cleveland. Booth 29.

U

UNITED COMPOUND CO., Buffalo.
Booth 59.

UNIVERSAL SAND EQUIPMENT CO.,
Cleveland. Booths 51 and 53.

U. S. REDUCTION CO., East Chicago,
Ind. Booth 67.

V

VESUVIUS CRUCIBLE CO., Swissvale,
Pa. Booth 217.

W

WHITE ROCK SILICA CO., Chicago.
Booth 237.

WHITING CORPN., Harvey, Ill. Booth
118.

WRIGHT MFG. CO., Bridgeport, Conn.
Booth 81.

Z

ZANESVILLE SAND CO., Zanesville,
Ohio. Booth 46.



NEW USE FOR STEEL IN PORTABLE MOORING MAST FOR DIRIGIBLE

ANOTHER new
use for struc-
tural steel is for an
85-ft. portable moor-
ing mast which is be-
ing erected alongside
the Goodyear Zep-
pelin dock at Akron,
Ohio, where the
United States Navy's
giant dirigible,
"Akron," is nearing
completion. The trial
flight of the new di-
rigible is expected to
take place early this
summer.



Four-Spindle Precision Borer for Production Work

PRECISION finishing of holes in free-cutting materials such as bronze, aluminum, fiber, bakelite and high quality soft cast iron is work which the boring machine shown in the illustration is designed to perform on a production basis. Named the Bore-Matic, and built by the Heald Machine Co., Worcester, Mass., this new machine is of the four-spindle type.

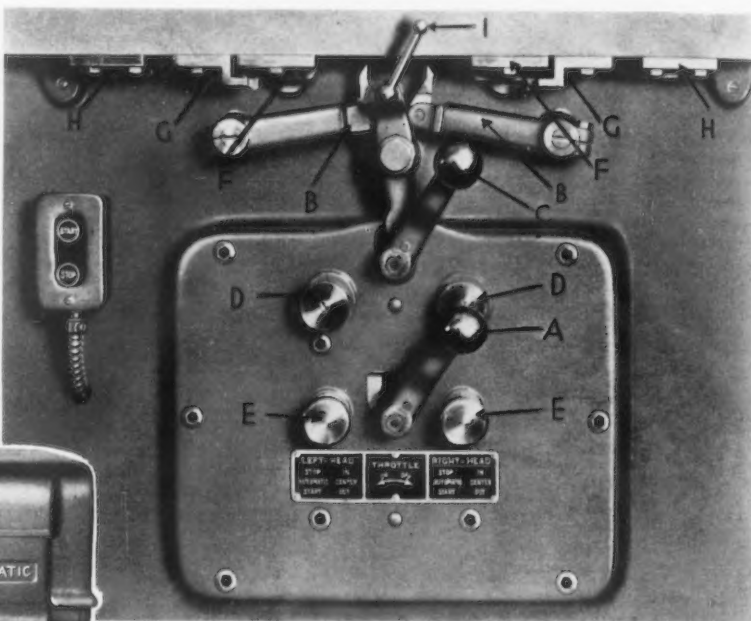
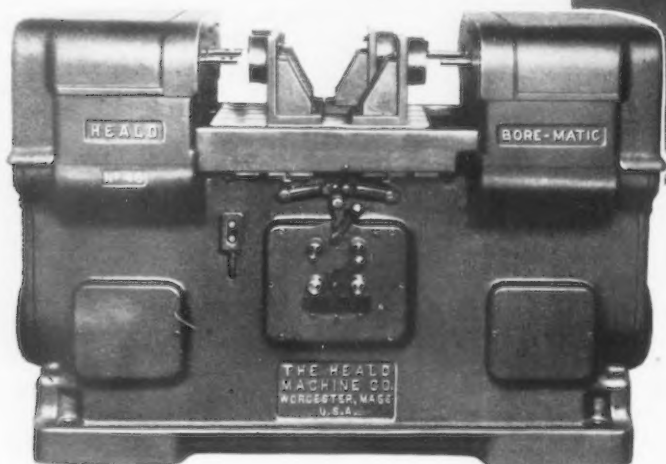
Diamond or tungsten-carbide tools are used. The machine will rough or finish-bore straight, taper, blind or interrupted holes within tolerances of "tenths" for size, taper and roundness. Smooth operation of speed control and feeds is obtained by the Heald hydraulic system.

The base of the machine is a one-piece box casting of fine grain iron

x 26 in., is provided with three longitudinal slots for mounting and clamping the work fixtures in position.

The reversing lever *C* provides for both automatic and hand reversal of the table, which moves in the direction in which the lever is thrown. The table may also be controlled by hand for convenience in setting up and for short runs.

The start, stop and automatic operations of the boring heads are controlled by the two push-pull knobs *E*.



CONTROLS for valves of the Bore-Matic's hydraulic feed system are grouped in the panel shown above.

having a high steel content. It weighs 3300 lb.; the weight of the entire machine is 6300 lb. The walls of the base casting are 1 1/4 in. thick. Equal distribution of metal and well spaced ribbing avoids internal stresses. The base has a three-point bearing and an extension at the rear provides a solid mounting for the driving motor. This construction prevents the transmission of vibrations to the boring spindles and the work.

The table is mounted on two ways, one flat, one Vee, spaced on 12 3/4 in. centers and extending the full length of the base casting. Pressure lubrication from the hydraulic system furnishes a continuous flow of oil to the ways. The hydraulic system for reciprocating the table, similar to that used on Heald internal grinders, includes a cylinder of large diameter providing table feeds ranging from 1/2 to 15 in. per min. as well as shockless reversal of the table.

The top of the table is of tray design and confines the coolant and borings within the table limits. A finished pad in the center, measuring 16

The boring head bridges are heavy one-piece ribbed castings bolted to the base. Their flat, accurately scraped upper surfaces are provided with buttons and transverse T-slots for lining up the boring heads and clamping them in position. A T-slot in the end of each bridge carries the idler pulleys of the boring head drive.

Valves governing every function of the Bore-Matic except the starting and stopping of the driving motor are contained in a control box. All controls are on the exterior panel of this box as shown in the close-up view.

Starting and stopping of the table are effected by the throttle lever *A*. Boring feeds are controlled by two slow-down valves operated by levers *B*, which are actuated by table cams *F*. These cams may be made to give an intermittent feed with an intermediate period of fast travel for finishing interrupted bores. The valves are set by the two hand-knobs *D*, which may be adjusted so that a different rate of table feed is obtained at each boring position. They are graduated to facilitate resetting.

which move in and out of the control panel. The "in" position is stop, the "center" position is the automatic control and the "out" position is the start. These knobs are knee high so that in an emergency the operator may quickly push them in to the stop position with his knee. The cams *H* are the adjustable positive stops which are used in connection with the reverse dogs *G* to obtain the safety reversing control.

When both ends of the machine are being used for boring the table moves rapidly from one end to the other. To prevent this movement being made before the operator has finished loading the fixture, the safety reversing lever *I* is provided. The operator normally moves this lever each time he finishes loading one end of the machine, allowing the machine to complete its cycle without interruption. If the operator, however, is delayed in loading one end, the table will stop at the other end as soon as the boring is completed and wait until the operator moves the safety lever in the direction in which the table should move. This is an important safety feature.

The machine is driven by a 7 1/2-hp. motor. A flexible coupling connects the motor shaft directly to a jack-shaft mounted on the rear of the base casting. From this shaft are driven the clutch-brake units that drive the boring heads, the oil pump of the hydraulic system and the coolant pump. The left-hand clutch brake unit is driven by a silent chain from a

sprocket on the jackshaft. Pin couplings and a connecting shaft, driving through herringbone reversing gears, transmit power to the right-hand unit. Thus the units are driven in opposite directions and therefore the multiple V-belt and grooved pulley drive to each bank of boring heads causes each boring bar to have the same direction of rotation in relation to the piece being bored. In other words, only one "hand" of tool is necessary. Boring head speeds can be varied from a few hundred revolutions per minute to 5000 r.p.m. by means of pulleys of different diameters.

Clutch-brake units, hydraulically operated and controlling the start, stop and automatic operation of the boring heads, are located within the base at each end of the casting. Each unit consists of an oversize adjustable multiple-disk clutch and brake which run in a bath of oil supplied from the hydraulic system.

The cycle of operation is as follows:

After loading the work fixtures, the operator opens the throttle lever and the table moves at its maximum speed of 15 ft. per min. in the direction in which the reversing lever is thrown. As the table starts forward to the boring position, the boring spindles at the end of the machine which the table is approaching start to rotate. When the work reaches a predetermined distance from the boring tool, the table automatically slows down to the boring feed set by the knob in the control box. The table continues at the slow feeding rate until the cut is completed. Then, as the table reverse dog strikes the eccentric of the safety reversing lever, the rotation of the boring heads stops and those on the other end of the machine automatically start. The table dwells at the end of the stroke in order to let the spindles come to a dead stop before the table reverses. This eliminates the chance of spiral marks appearing on the work.

where it is cleaned, and thence to the oil pump.

The No. 984 grinder, here shown, having a capacity of 84 in., is regularly equipped with a 36-in. diameter segmental wheel chuck, driven through silent chain by a 40-hp. motor. A counterbalanced wheel dresser is always ready for instant use. The wheel spindle is mounted in precision type radial and thrust ball bearings, and is provided with a brake. A motor-driven Ruthman pump unit located within a 75-gal. tank supplies coolant to two 1½-in. discharging outlets. One of these streams plays on the grinding wheel and the other on the work to be ground.

Unusual width of ways as well as center-to-center distance between ways is a feature emphasized. The bed of the machine is long enough to prevent overhang of the table at either extreme end of its stroke.

This face grinder is suitable for knife grinding purposes, railroad shop operations and general manufacturing, and can be fitted with various types of plain and revolving magnetic chucks for knife bars. The approximate weight of the 84-in. machine shown, including motors, chuck, wheels and wet grinding system, is 18,500 lb. Floor space required is 7½ x 18 ft.

New Hydraulically-Operated Face Grinder

A SERIES of hydraulically operated face grinding machines are now being made by the Hanchett Mfg. Co., Big Rapids, Mich. Designated as series 900, these machines are made in various lengths having capacities ranging from 50 to 192 in.

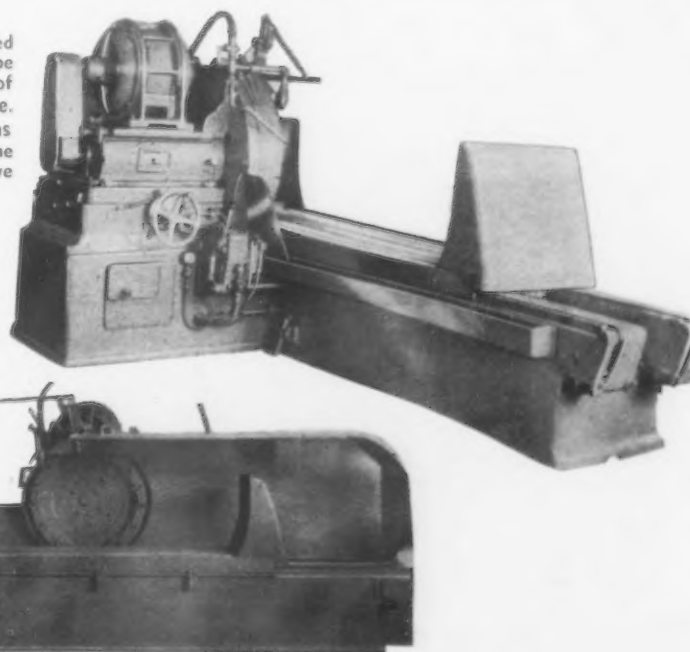
Hydraulic operation of the work table or platen by a cylinder and piston mechanism eliminates the rack and gear drive. Table speeds of 0 to 90 ft. per min. are standard, but on special machines the maximum speed may be as high as 160 ft. per min. Controls are grouped at the operator's station, and the mechanism is compact, giving ample room for manipulating and handling the work. Levers for starting, stopping, reversing and instantly changing the speed are also conveniently located. A foot pedal is within reach of the operator for bypassing the dogs and running the carriage to the safety dogs when loading, unloading or inspecting the work.

Grinding wheelhead travel is hydraulically actuated and the feed of the wheel toward the work can be set to a predetermined stop. The arrangement also provides automatic feed ranging from 0.00025 in., minimum, to 0.005 in., maximum. Independent hand cross-feed is also supplied. Hydraulic pressure is furnished by a Tuthill constant-flow gear pump

mounted on a separate plate so that the entire unit may be removed from within the machine bed. This pump is driven by a 7½-hp. motor.

To eliminate wear of the ways due to abrasive material a patented covering system is employed. This comprises heavy fabric composition belts, connected to each end of the table or platen, passing over adjustable pulleys and through the bed underneath the table. Forced feed lubrication is provided by an effective pressure system. Lubricant drains from the ways into channels, through a Purolator system

THE centralized control may be seen in this view of the operating side. Belts, arranged as shown, protect the ways from abrasive material.



The bed is of sufficient length to prevent overhang of the table at either end of the stroke.

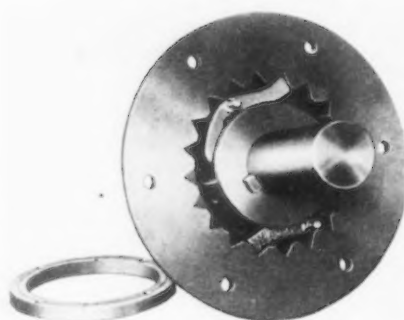
Acorn Nut Has Stainless Steel Cover

THE acorn nut made in a range of sizes and thread specifications by the Ferry Cap & Set Screw Co., Cleveland, is now furnished with a stainless steel cover. Covers for the steel or brass hexagon nuts are supplied in both burnished and polished finish. In addition to non-rusting and non-tarnishing characteristics, attractive appearance is featured.

Shaft Back Stop Also Serves as Bearing

A DEVICE designated as the Landahl Life-Time back stop, for preventing shaft reversal, has been placed on the market by the Fairfield Engineering Co., Marion, Ohio. The action is such that no impact needs to be overcome, operation being silent and instantaneous. The device also serves as a bearing, and is said to eliminate shaft end-thrust in either direction, so that separate set collars are not needed. No extra shaft space is required.

The device comprises two locking pawls mounted on pins held by two floating rings and a pawl collar. All of these parts rotate as a unit by engagement of the pawls with the pawl collar. This pawl collar, which is keyed to the shaft, is shaped so that the pawls do not engage the ratchet when the shaft is traveling in the proper direction but lock in the ratchet as soon as the direction reverses. The floating rings are seated



in the ratchet housing, but are free to rotate with the pawls and pawl collar. The pawls engage and disengage without rubbing the ratchet, so that there is a minimum of wear. All working parts rotate in an oil bath, and grooves convey lubricant to the housing-ends which serve as shaft bearings.

Two styles, with plain flange and pedestal type bearing, respectively, and in several sizes for shaft diameters ranging from 1 7/16-7 1/2 in., are made.



Develops Sizing Device for Centerless Grinder

THE automatic sizing device developed by Cincinnati Grinders, Inc., Cincinnati, for its No. 2 centerless grinders compensates for grinding wheel wear, thus making unnecessary the frequent checking of the work and adjustment of the feed wheel slide formerly required of the operator.

In the centerless method of grind-

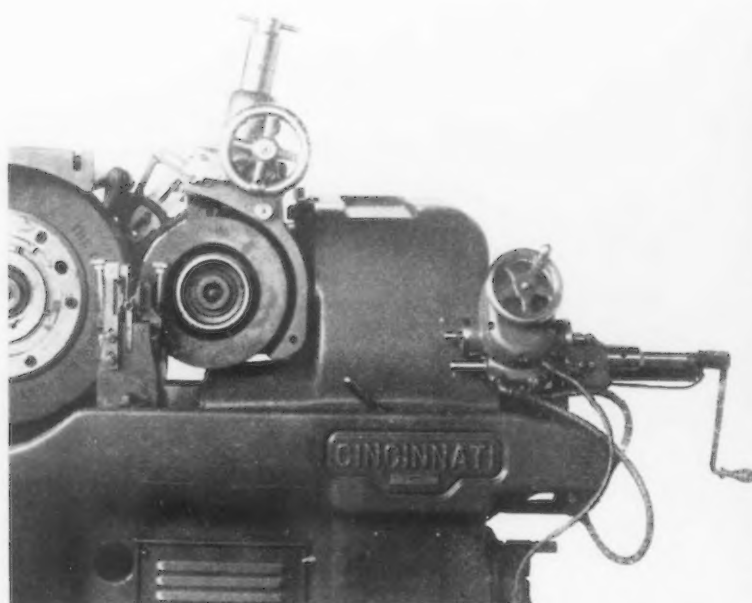
ing, the throat dimension between grinding wheel and feed wheel determines the size of the piece being ground. As the wheel wears, the grinding throat becomes larger and, accordingly, the diameter of the work increases. The automatic sizing device advances the feed wheel in such a way as to maintain the required throat dimension within limits of 0.0001 in.

The actual mechanism is relatively simple. An electric contact gage, shown in the close-up view, is mounted on the back part of the work

fixture. A gaging member is so arranged that as the diameter of the work increases, due to wear of the grinding wheel, a contact shoe at the end of the gaging member contacts with the work. The resulting friction is sufficient to carry the gaging member through a considerable arc, operating a small mercury switch mounted close to the pivoted end of the arm. The electric contact completes a circuit which energizes a solenoid controlling a valve on the feed mechanism, which by hydraulic means operates the in-feed slide screw. Provision is made by a ratchet and pawl adjustment, connected to the worm-shaft operating the feed slide nut, so that an in-feed movement of the slide as fine as 0.0001 in. may be obtained.

An adjustable needle valve on the exhaust port is set to delay the return of the feed piston for an interval necessary to permit the work which has been ground during this adjustment to pass between the gage contacts. If the work is still oversize, the feed will operate again. When the correct size is restored, however, the gaging member will return to normal position and the electric contact will be broken, no further action of the feed mechanism taking place. All backlash on the feed screw is eliminated by means of a hydraulic cylinder attached to the machine bed.

The design of this sizing mechanism is such that adjustments can be made for any angularity of blade and varying diameters of work. If desired, the gage may be made inoperative or entirely removed from the grinder. It is pointed out that by automatically sizing work during the roughing and semi-finishing operations, a uniform amount of stock is left for the finishing operation, thus assuring closer limits of accuracy.



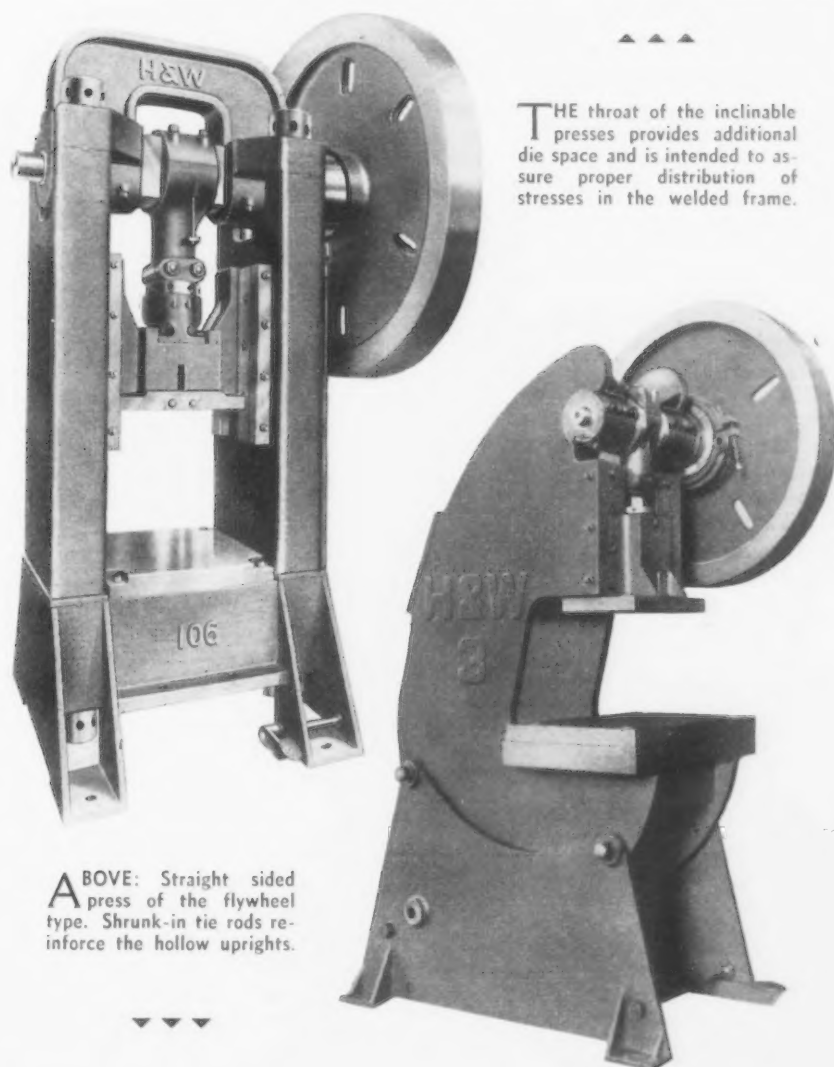
Front view at left shows infeed mechanism that is controlled electrically. The electric contact gage for sizing the work automatically is shown in the close-up rear view at right.

Introduces Line of Welded Steel Power Presses

WELED steel frames are used in the construction of a series of straight-sided and inclinable presses brought out by the Henry & Wright Mfg. Co., Hartford, Conn., as a complementary line to its dieing machines.

Before the press frames are ma-

crankshafts up to 12 in. in diameter. The larger presses may be equipped with either single or twin-gear drive, as preferred. Shrunk-in tie rods are used. Proper support for the dies, even under eccentric loading, is provided by the design of the base. The hollow rectangular sections form-



ABOVE: Straight sided press of the flywheel type. Shrunk-in tie rods reinforce the hollow uprights.

THE throat of the inclinable presses provides additional die space and is intended to assure proper distribution of stresses in the welded frame.

chined they are thoroughly annealed to remove strains which may be set up during rolling or welding; such strains, if allowed to remain in the steel, might be the cause of distortion after the machines have been put in operation. Greater strength with less weight, smaller amount of deflection for a given load, and greater resistance to fatigue are advantages emphasized for the welded steel construction. In addition, designs may easily be modified to suit requirements.

The straight-sided presses are furnished in the flywheel type, as illustrated; also in single-gear, double-gear or triple-gear types with

ing the uprights are reinforced internally. The necessary rigidity of support for the crankshaft is provided by the crown piece which, like the base, uprights and slides, is made from steel plates, cut and formed to shape, then arc welded, using high grade covered welding wire.

The crankshaft, a heat-treated, hammered alloy-steel forging, is mounted in hard bronze-bushed bearings in the crown. The upper and lower ends of the connection are made from electric furnace steel castings, the upper end being bushed with hard bronze and the lower end, or wrist, having a bearing on a hard bronze

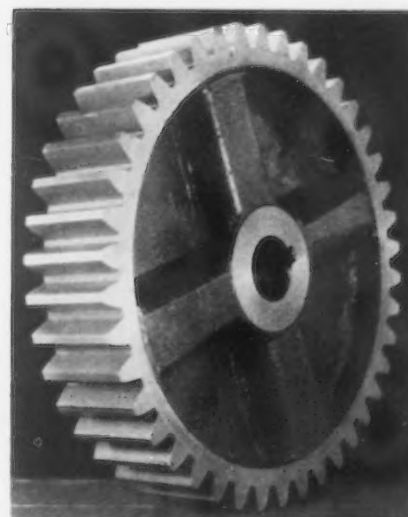
lining mounted in the slide. The guides on the uprights are long enough to give proper alignment to the slide at all times. The rear guide is also bronze lined and the angular gib is of close-grained gray iron.

The throat of the inclinable presses is of special design, intended to provide additional die space and to secure proper distribution of the stresses throughout the frame. Other features and materials of these presses are essentially the same as those of the straight-sided presses. Timken roller bearings are installed on the pinion shafts of the geared presses. All gears are of welded steel construction; the rims of 0.40 per cent carbon steel, the hubs of 0.10 carbon steel.

Welded Steel Gears for Heavy-Duty Service

GEARS of welded steel construction have been announced by the Philadelphia Gear Works, Erie Avenue and G Street, Philadelphia, in diameters ranging from 15 to 168 in. Intended for heavy-duty service, these "Philweld" gears are described as having approximately 50 per cent greater tensile strength than cast steel gears and to weigh 10 per cent less. In addition to increased life, attractive appearance is emphasized, the welded joints being inconspicuous and smoothly finished.

Rolled S.A.E. 1040 steel plate is used for the rim, web and arms. The rim is cut as a solid ring from flat plate by means of a gas torch which also is used to cut the disk forming the web of the gear. The arms are cut from plate, pressed into channel shape and welded at both sides. The hub is made from a forged steel bar,



drilled to receive the shaft. After welding and before machining, the gear is normalized to prevent subsequent warping. The welded gears are obtainable in spur, helical, bevel, internal, herringbone and continuous herringbone (Sykes) types.

New Adjustable Snap Gages and Setting Plugs

THREE new adjustable limit snap gages of the "Trusform" type and a line of setting plugs combining "go" and "not go" dimensions in one piece have been placed on the market by the Pratt & Whitney Co., Hartford, Conn. The snap gages, designated as models A, B and C, are shown grouped around

Adjustment of the movable anvils of the model C gage is made by means of push and pull screws engaging in threads in both anvil and frame. This mechanism is shown in one of the sectional views. The screws have right and left-hand threads, each 40 threads per inch, so that a single turn will advance or retract an anvil $1/20$ in. An ordinary screw driver is used to set the gage. The adjustment is sensitive and is not disturbed by the action of the locking mechanism, which comprises two bushings and a locking screw. Each bushing is bev-

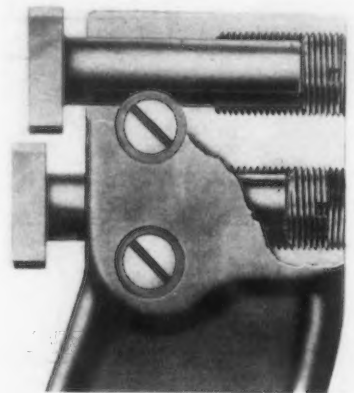
small contact surfaces, are desirable for certain gaging requirements where an especially sensitive "feel" is necessary. It is pointed out that with the round type of anvil it is impossible to gage work close to a shoulder. The model A gage appears at the left in the illustration.

The anvil locking mechanism is similar for all three types of gages, that of the model C gage being shown in cross section. The adjusting and locking screws are countersunk below the surfaces of the frame so that settings can be sealed with wax. Model C gages are made in 15 frame sizes that provide a complete gaging range from 0 to 12 in. Eight sizes of the model B are available, their range be-

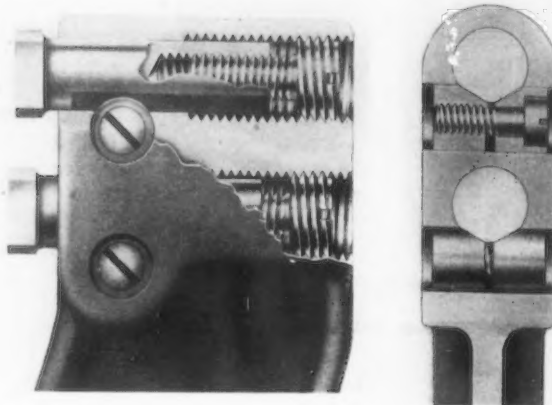


LEFT: Three new Pratt & Whitney snap gages and a setting plug of the "go-no go" type.

RIGHT: Adjusting screws of the model A and B gages.



MOVABLE anvils of the model C gage are set by the double-action screw mechanism shown at right. The anvils are locked as indicated in the small cross-section view.



one of the smaller sizes of setting plugs in the accompanying illustration.

The frames of the snap gages are made in the form of a bridge truss, as heretofore, with inner and outer ribs flanged. A thin web with struts placed at the necessary stress angles produces rigidity and eliminates excess weight. The new models of snap gages differ, however, in the design and method of adjustment of the anvils.

The model C gage, shown in upright position at the rear of the illustration, is fitted with one solid and two adjustable anvils, the latter for "go" and "not go" dimensions. The solid anvil projects at the end of the frame to facilitate locating the gage on the work. It is flush with the frame on the sides, however, to permit checking close to a shoulder. Both solid and adjustable anvils have surfaces finished to a high precision by the same machine-lapping process used in making Hoke gage blocks.

and bears against one of the two flat surfaces on the shank of the anvil.

Bakelite grips on the frame of the model C gage insulate the metal parts from the heat of the operator's hand. This feature is not incorporated in the design of the other two snap gages.

The model B gage (at the right in the illustration) also differs from the gage described above in that four adjustable anvils are used. These are square and the anvils in each pair are close together to avoid leaving a gap in which a part of the work might catch and become marred. As in the model C gage, the anvils are wide enough to permit checking close to a shoulder. The anvil adjustments, shown in one of the sectional views, are made by push screws threaded in the gage frame and in contact with the end of the anvils.

This type of adjustment is used also on the model A gage, which, like the model B, has four anvils. These anvils are round, however, and, having

ing from $1/4$ to 5 in.; there are also eight model A sizes providing for a range of work from 0 to 5 in.

Adjustment of snap gages is facilitated by the use of Pratt & Whitney setting plugs, which are obtainable in any required dimensions. As stated, these plugs incorporate "go" and "not go" dimensions in a single piece. Plugs 1 in. and more in diameter are made with separate blanks for each dimension, these being separated by a washer of smaller diameter and held together solidly with a screw. Plugs smaller than 1 in. are made solid. An insulator at each end of the setting plugs prevents the heat of the hand from affecting the gaging size. These insulators are colored to identify the gaging diameter, red for the "not go" and green for the "go" end. It is pointed out that, being round, these setting plugs are especially valuable for setting snap gages which are to be used on round work. In this case the "feel" is the same for both setting and gaging.

Encouraged by the success of the second exposition, held in Cleveland recently, the Midwestern Exposition Co., manager, announces that the third National Industrial Equipment Exposition, featuring management, maintenance and materials handling, will be held in April, 1932. A survey now being made will determine the location.

TO HIM WHO HATH

TO him who hath shall be given and from him who hath not shall be taken even that which he hath."

Twenty centuries ago were these strange and fearsome words of wisdom uttered. They embody in one sentence the philosophy of the survival of the fittest in the realm of material progress as well as in that of spiritual values.

How aptly this sentence applies to the present and the coming struggle between industrial producers for a living share of the diminished volumes of production.

In spite of widespread overcapacity, in spite of increasing competition at home and abroad, in spite of declining price trends, in spite of diminished demand, some industrial concerns in every line of industry will steadily progress. To them shall be given continuing success and increasing profits.

And because of overcapacity, because of increasing competition at home and abroad, because of declining price trends, because of diminished demand, some concerns in these same lines of industry will as surely lose that which they now have.

What is the "hath" and the "hath not" which will differentiate the winners from the losers in the coming competitive struggle?

It is the ability to read the handwriting on the wall and the courage to act upon it.

That message is written plainly today. He who runs may read the words: "Prepare for cost reduction now, if you hope to compete in the days to come."

Improved machinery is still the master force of cost reduction, as it has been since the birth of the wheel, the wedge, the lever and the screw.

Concerns which will reap the rewards of victory in the days to come are now placing themselves upon a favorable cost level. They are replacing less capable equipment with the distinctly superior machinery and tools that are now available.

Immediate and intelligent modernization of plant equipment is the strategic approach to future profit insurance.

To him who hath the vision to realize this truth and the courage to act upon it shall be given golden reward. But from him who hath not may be taken even that which he hath.

By
JOHN H. VAN DEVENTER

Industrial Consultant
The Iron Age

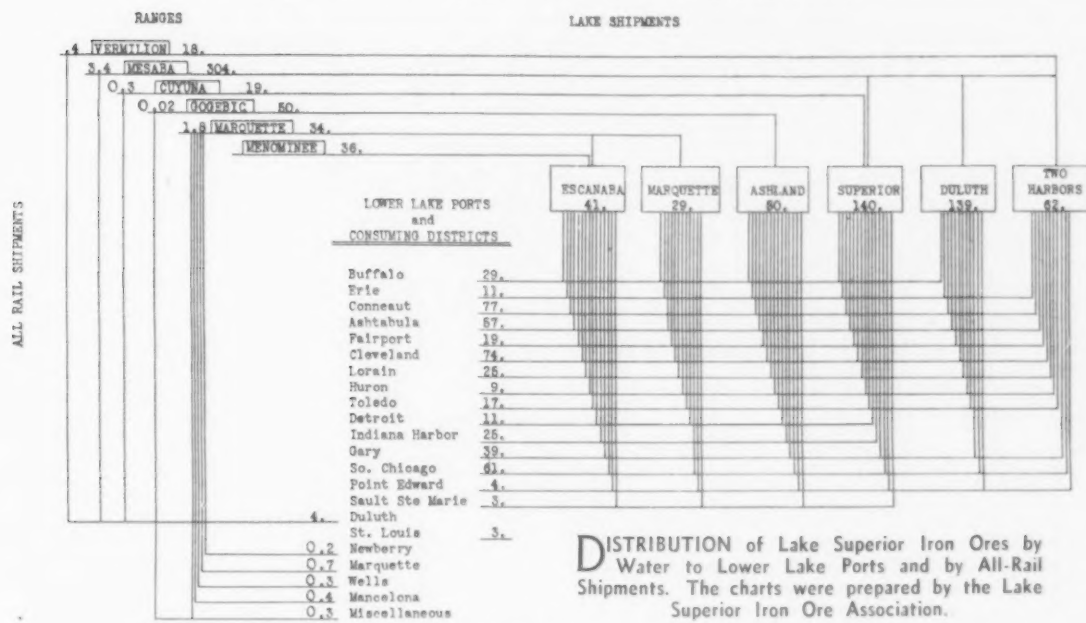
*Copies of this insert may be secured from the Reader Service
Department of The Iron Age, 239 West 39th Street, New York.*

Previous recent editorials on the subject of replacement:

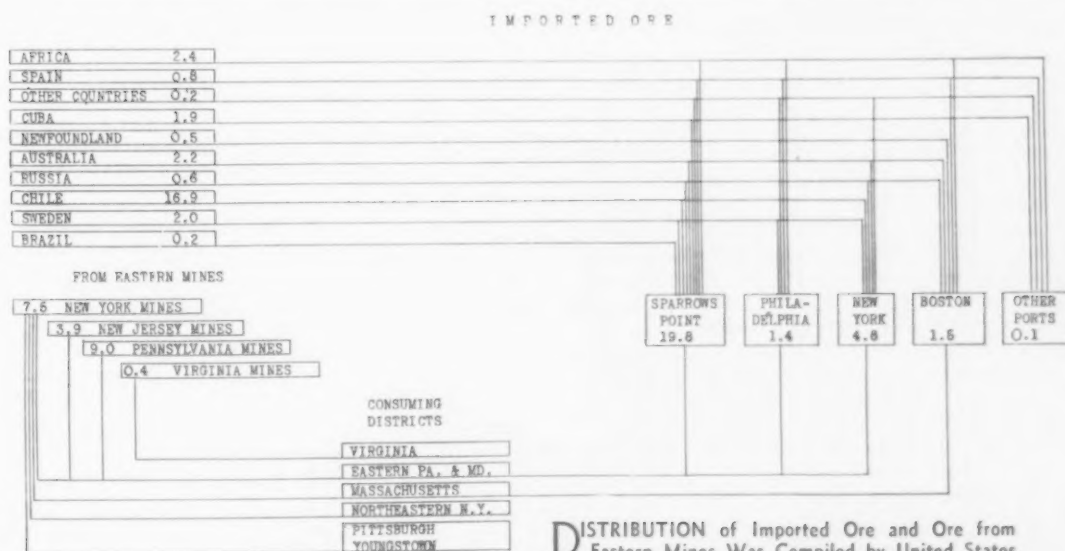
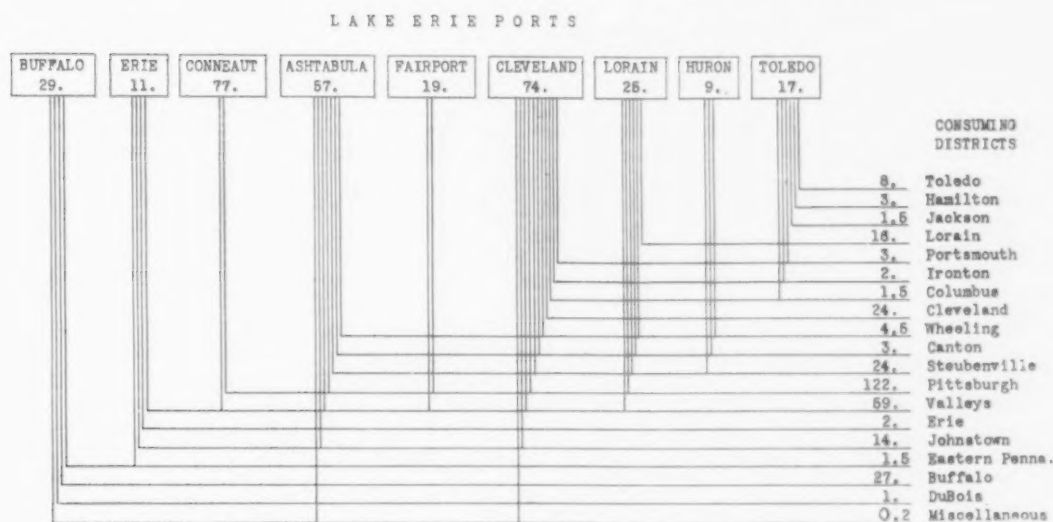
- "Machinery Needs a Friend," The Iron Age, March 12, 1931.
- "Depressions Uncover Obsolescence," The Iron Age, March 19, 1931.
- "One Word Costs Billions," The Iron Age, April 9, 1931.
- "How to Win This War," The Iron Age, April 16, 1931.
- "How Bankers Regard Equipment Loans," The Iron Age, April 23, 1931.

Sources and Distribution of Iron Ore in 1930

(Figures Indicate Quantities in Units of 100,000 Tons)



DISTRIBUTION of Lake Superior Iron Ores by Water to Lower Lake Ports and by All-Rail Shipments. The charts were prepared by the Lake Superior Iron Ore Association.



DISTRIBUTION of Imported Ore and Ore from Eastern Mines Was Compiled by United States Department of Commerce.

MECHANICAL ENGINEERS VISIT BIRMINGHAM—CITY OF DESTINY

BIRMINGHAM, the South's leading industrial center, was the meeting place for the spring convention of the American Society of Mechanical Engineers on April 20 to 24. One afternoon and two entire days were set aside for plant inspection, so that visiting engineers might study at first hand the wide range of industries, extending from the mining of iron ore and coal and the generation of hydroelectric power to the manufacture of finished products, which have placed the Birmingham district in the forefront in industrial development.

Birmingham is spoken of locally as the "magic city" because of its unusually rapid growth. Only 60 years old, it had a population of 259,678 in 1930. Jefferson County, in which Birmingham is located, had a population in 1930 of 431,493, the largest for any county in the South, except Orleans Parish, La.

Unusually Rich Natural Resources

To the visitor, however, the past achievements of Birmingham pale into insignificance compared with the possibilities lying ahead of it. Endowed with unusually rich natural resources, a favorable climate, excellent railroad facilities, navigable water connection with the sea, and capable and energetic leadership, it impresses one as a city of destiny. Lying in the lap of a valley between two low mountain ranges, one yielding iron ore and the other coal, while the valley itself is underlain with dolomite, the Birmingham district is the only place in the world, it is said, where the necessary materials for making pig iron are found within a radius of 5 miles. The cost of making pig iron, moreover, is reputed to be the lowest in the world, except in India. Alabama pig iron is sold in most markets of the country, as far north as Chicago and New England.

Ore reserves are unusually large and markets for manufactured products are rapidly growing. In Red Mountain, which girds one side of the valley, the Tennessee Coal, Iron & Railroad Co. is estimated to have reserves of approximately one billion tons of red ore, while the Woodward Iron Co. has close to one-third of a billion tons and other iron produc-

ers smaller, but nevertheless sizable amounts.

Birmingham Looks to the Future

It is because of its resources and its vantage point as a distributing center that Birmingham sentiment is so confident and unperturbed in the face of the present business depression. It regards its future as secure, although recognizing that the current readjustment may grow even more severe before improvement sets in. Business recession struck Birmingham two years before it became general throughout the country. Economic distress in the South has been accentuated by the collapse of the cotton market. Southern farmers are described as "broke," with no immediate relief for them in sight.

But the cyclical downswing has not caused Birmingham to forget that the industrialization of the South, although interrupted, is destined to proceed with renewed vigor. Birmingham also looks abroad—not to Europe, but to Latin America and the Orient. These parts of the world offer rich potential markets, barely scratched as yet.

Birmingham an Inland Port

To reach this trade Birmingham has the advantage of regular all-year

water transportation. The Warrior River provides an 8-ft. channel from Mobile to Birmingham, 23 miles from Birmingham. The Mississippi-Warrior (Federal) barge service plies between Mobile and Birmingham, and a switching railroad, owned by the barge line, connects Birmingham with Birmingham, switching charges on through traffic being absorbed in the barge rates. At Birmingham the barge line has a terminal warehouse for the transfer of package freight to river craft, while the Tennessee Coal, Iron & Railroad Co. has a large gantry crane, which commands railroad tracks and barges, facilitating the transfer of heavy products by magnet or crane bucket. At Mobile privately owned wharves have recently been supplemented by new State docks constructed at a cost of \$10,000,000.

This water service is also invaluable for handling heavy, bulky products for coastwise trade. Sea-going barges are towed direct from Birmingham to such ports as Houston, Tex., and Tampa, Fla.

With all of these advantages the future of Birmingham is alluring, but there is no effort to speed up industrial development ahead of the absorbing power of available markets. It is recognized that too rapid plant expansion may be an evil rather than

NEW OFFICERS NOMINATED

Nominations for officers of the A. S. M. E. were announced at the banquet. Election will be by letter ballot of the entire membership, closing Sept. 22. The nominees presented were:

PRESIDENT: Conrad N. Lauer, president, Philadelphia Gas Works, Philadelphia.
VICE-PRESIDENTS: Robert M. Gates, vice-president, Superheater Co., New York; Charles M. Allen, professor of hydraulic engineering, Worcester Polytechnic Institute, Worcester, Mass.; Fred H. Dorner, mechanical engineer, Milwaukee, Wis.; William B. Gregory, professor of experimental engineering, Tulane University, New Orleans, La.

MANAGERS: Alexander J. Dickie, editor, Pacific Marine Review, San Francisco; Eugene W. O'Brien, editor, Southern Power Journal, Atlanta, Ga.; Harry R. Westcott, president, Westcott & Mapes, Inc., New Haven, Conn.

Delegates to American Engineering Council: Conrad N. Lauer, St. Paul, Minn.; R. E. Flanders, Springfield, Vt.; C. E. Ferris, Knoxville, Tenn.; L. P. Alford, New York; J. H. Lawrence, New York; R. C. Marshall, Jr., Chicago; A. A. Potter, LaFayette, Ind.; W. H. Trask, Jr., Salt Lake City, Utah; E. C. Hutchinson, New York.

a boon. As Herbert C. Ryding, president, Tennessee Coal, Iron & Railroad Co., said in a paper before the Mechanical Engineers on the "Principles of Industrial Plant Location," "The economic capacity of an industrial plant is determined by the existing markets plus provision for expansion to meet the requirements of future markets."

And that the Tennessee company is ignoring cyclical disturbances in carrying out its long-range program to keep pace with future demands is evident from the fact that it is now completing a large addition to its sheet plant and is constructing a 42-in. universal plate mill.

Wage Policy Wins Good Will

The protracted depression in Birmingham has brought its train of serious problems for industrial management. Employers have religiously adhered to the policy of rotating jobs, notwithstanding the increased costs involved, to keep a maximum number of men employed. Some large organizations have provided free coal to their employees, and others, with company houses, have reduced rent.

There has been a sincere effort to postpone wage reductions, although latterly several cuts have been made and others appear inevitable. One large company recently called its employees together and announced that it has exhausted all efforts to introduce economies in operations, but that the selling prices of its products had declined so sharply that there was no alternative but to reduce wage rates. It offered to throw its books open to the inspection of the men so that they might satisfy themselves as to the truly critical character of the situation. Spokesmen for the employees replied that they appreciated the effort that the management had made in their behalf and had really expected a wage cut long ago.

While it may be argued that earlier wage readjustments might have paved the way for quicker business recovery, there is no question that the efforts employers have made to sustain wage rates have built up a spirit of good will that is of incalculable value in industrial relations.

The Engineer and the Humanities

In view of the human problems that have occupied so much of the attention of management in Birmingham as well as elsewhere during the current depression, the address of President Roy V. Wright at the banquet of the A. S. M. E. on "How About the Humanities?" was timely. He pointed out that engineering genius was largely responsible for our great industrial progress, and the benefits that it brought society. Yet this progress brought with it certain evils, such as technological unemployment, which challenge engineers to still greater effort. To insure a broader approach to such problems, engineering education of the future, he stated,

▲ ▲ ▲
ALTHOUGH hit by the depression two years before the rest of the country and adversely affected by a critical agricultural situation, Birmingham has faith in its future.

Rich natural resources, water connection with the sea and an excellent location to serve the growing demands that will grow out of the industrialization of the South and the economic development of Latin America and the Orient give Birmingham assurance of further rapid growth.

Visits by members of the A. S. M. E. to Birmingham district plants reveal a high standard of management and the use of the most modern equipment.

must be along more cultural lines, embracing economics, sociology, art, literature and other essentials of a liberal education, as well as purely technical subjects.

The problem of technological employment exists in Birmingham as in other industrial centers. At one plant visited by the writer mechanization has reduced the number of employees from 350 to 150. The way out of this dilemma, according to Dr. H. E. Howe, editor, *Industrial and Engineering Chemistry*, who was another banquet speaker, is to create new industries. He exhibited many new products recently created by scientific research, many of them made from cellulose, which promise to find wide markets and engage new plants and hence employees. He admitted that the rapid development of new products has one disadvantage—creating investment hazards. In other words, new products often threaten the markets of established products.

Birmingham is not lacking in new products. Both of the centrifugal methods of making cast iron pipe, the De Lavaud and monocast processes, are in operation in Birmingham plants and were the subjects of papers at the convention.

Evidences of Good Management

Enterprise, energy and good management are apparent on every hand in the Birmingham district. The city itself is well laid out, with broad and well kept streets, and the industrial plants are orderly and well maintained. An all-day trip through the properties of the Tennessee Coal, Iron & Railroad Co. on April 22 was a lesson in good management. Three hundred and fifty people were taken on a special train to the iron mines, the Fairfield and Ensley plants and the coal mines, and returned to Birmingham on scheduled time. At 12.15 p. m., a barbecue lunch was served at Bayview Coal Mines, and the fare was not only ample and excellent, but promptly served. The routes through the various plants where stops were made were marked out by white calimined lines, so that no one of the large group of visitors could go astray. Numerous guides were on hand to answer questions.

Throughout the Tennessee company

properties cleanliness and orderliness were in evidence. No unsightly piles of trash were to be seen anywhere. Vacant spaces between buildings were frequently brightened by well kept lawns.

Humanics in Birmingham Plants

Wage standards at Birmingham are somewhat lower than in the North, but living costs are lower also. The climate is mild, so that houses require no foundations, and large expenditures for winter fuel are unnecessary. Farm produce is cheap.

Moreover, wage earners benefit by extra-wage benefits. The Tennessee Coal, Iron & Railroad Co. has the best equipped hospital south of the Ohio River and it deals not merely with accident cases but carries on an untiring campaign against disease. The importance of this service cannot be overestimated, as colored people particularly are frequently the prey of quacks.

The Woodward Iron Co., also, plays a great deal of attention to the health of its employees. Scattered throughout its properties it has five emergency hospitals, where surgical, medical and dental service is given. Its interest in its employees does not stop with health. It extends to all of the things that affect the welfare of its forces and their families. Commissaries are provided where groceries, meats and dry goods can be bought at reasonable prices. Supplementary funds have insured the employment of a superior teaching staff in the county schools on its properties, and pleasant and attractively appointed school buildings have been supplied. Kindergarten and home economics rooms are in separate buildings. In the kindergarten great stress is laid on attractive color schemes and good pictures, since the Woodward management believes that good taste can be brought within the reach of all. To cultivate poise and grace the children are taught dancing. Music is brought to them by victrola. Home economics is taught in buildings laid out like an employee's cottage, so that all of the daily problems of the housewife will be met as they develop in the average home.

Throughout the company's properties, cleanliness and orderliness are

insisted upon. The natural beauty of the wooded hills is everywhere preserved, and open spaces are beautified by well trimmed lawns. A golf course has been provided in a beautiful natural setting, and an open air theater, attractively landscaped, is the scene of pageants and aesthetic dancing by both white and colored school children.

All of these activities are under the direction of a department of humanities.

The same characteristics of good management that are to be noted in the company's work in human relations are to be observed in the operation of mines and plants. Everywhere cleanliness and orderliness are the rule. Equipment is freshly painted and of the most modern type. Mechanization has been applied to virtually all operations in the mines, as well as the blast furnace and coke plants. Heat treatment and the use of new alloys has greatly lengthened the life of the moving parts of machinery. Ferrous and non-ferrous foundries, machine shop, heat treating plant, structural shop and locomotive repair shop are among the facilities provided to make the company virtually self-sufficing so far as

the maintenance of equipment is concerned.

Frank H. Crockard, president, Woodward Iron Co., is chairman of the Birmingham section of the A. S. M. E., under whom all the arrangements for the convention were made.

J. E. Fries, chief engineer, Tennessee Coal, Iron & Railroad Co., is vice-chairman of the Birmingham section and welcomed members and guests of the society to Birmingham at a luncheon meeting held at the Southern Club Monday noon. Hugh Morrow, president, Sloss-Sheffield Steel & Iron Co., was toastmaster at the banquet.

Entertainment included a dinner dance at the Hollywood Country Club Monday night and drives through Birmingham's unusually beautiful residential section on Red Mountain overlooking the city and Shade's Mountain beyond.

The famed Southern hospitality proved to be genuine. Even the newspapers aided in making one feel at home. The Birmingham *Age-Herald*, it develops, started its existence as *The Iron Age*, becoming the *Age-Herald* upon consolidation with the Birmingham *Herald*.

Materials Handling Comes in for Major Attention

THE railroad session of the meeting was reported in our issue of last week. The materials-handling session was featured by the reading of three papers: "Mold-Handling Methods in Foundries," by W. L. Hartley, engineer, foundry division, Link-Belt Co., Chicago; "Materials Handling in the Automotive Machine Shop," by Norman H. Preble, Jervis B. Webb Co., Detroit; and "Preparation and Distribution of Molding Sands," by H. L. McKinnon, secretary, C. O. Bartlett & Snow Co., Cleveland.

In the discussion, the point was brought up that maintenance costs were inordinately high on conveying equipment, particularly in the foundry. Mr. McKinnon commented that his company equipped conveyors in three plants with anti-friction bearings just to meet the problem of maintenance. He said that it seemed impossible to keep dirt out of plain bearings and that therefore the trend seems to be toward anti-friction bearings, inclosed gearing and direct-connected drives.

Mr. Preble asserted that the reduction of maintenance costs is largely a matter of price. Pressure for price is such that buyers frequently will not pay for equipment that will stand up. Lack of lubrication is always serious. No piece of engineering equipment will give good service unless it is properly taken care of.

One speaker made the comment that his company found that conveying equipment stood up better with-

out than with lubrication. (Apparently the type of lubrication is important. If the lubrication system is such that new grease forces old grease with sand and dirt into the bearing, it is deleterious. If, however, the new grease is introduced in such a way that old grease is forced out of the bearing, the grease acts as a seal to keep dirt out of the bearing.)

The question was asked whether the business depression had checked the economies possible from the use of materials-handling equipment. Mr. McKinnon, although pointing out that the quality of management is even more important than equipment, called attention to an article in THE IRON AGE of March 26 by Arnold Lenz, which indicated a further increase in efficiency in the Chevrolet foundry in 1930, although production in that year showed a considerable decline from that of 1929.

In commenting on the application of materials-handling equipment in the automotive industry, Mr. Preble stated that rapid changes in production methods require that motor car companies write off new conveyor setups within a period of 12 months.

In stressing the large amount of time taken up in handling materials, Mr. Preble quoted H. V. Coes, Ford, Bacon & Davis, Inc., New York, as stating that only one-third or one-half of the productive worker's time is actually taken up in productive operations, the remainder of his time being devoted to moving or going

after stock, tools, jigs or fixtures, or waiting for material to be delivered to him or taken from him.

Material-Handling Equipment Reduces Inventories

Material-handling equipment can do much to reduce the time or effort necessary to obtain and dispose of the pieces on which the operator is engaged. It can materially decrease inventory by keeping all material in process on the move. It can sharply increase the amount of productive capacity per unit of floor space by reducing the space occupied by stock in process, storage banks, etc.

With reference to reduction in inventory Mr. Preble said that no automobile plant would be satisfied if its turnover were not 24 times a year, and 30 times a year is not unusual. When General Motors Corp. took over the Frigidaire plant, the turnover was six times a year. It has now been increased to 30 times. This is an example of efficient planning and management with proper equipment. The conveyor, he emphasized, cannot be expected to accomplish desired results unless it is assisted by clear thinking and planning ahead.

Material-handling equipment can frequently reduce costs without reducing personnel, Mr. Preble declared. He referred to a plant in which a conveyor system which had cost \$55,000 to install had replaced very few men but had saved \$60,000 a year in spoilage. This, he said, was not an isolated case.

Addressing himself to the subject of reduction of inventory, Erik Oberg, editor, *Machinery*, who presided at the session, mentioned a mid-Western plant which reduced its working force from 3500 to 2200 and increased output 20 per cent. The improvement had not been due to the installation of more efficient production machinery. It resulted from the fact that everything was conveyORIZED—inventories were put on hooks and the men were not required to wait for anything.

In discussing mullers Mr. McKinnon pointed out the need for the right kind of a muller for a specific kind of sand. It has been found in France that fine brass sand improves until it is milled 45 sec. If milled longer it gets steadily worse. But for heavy steel sands mulling for 10 min. is not unusual.

The question arose as to whether molding sand should be run through a magnetic separator before or after screening. Mr. McKinnon said that in many cases it is found preferable to put the magnetic separator beyond the screen. This permits the reclamation of a great deal of sand that would stick to gagers and rods in magnetic separation. The rods and gagers really help the screen break up the sand. Frequently two magnets are put into the system—one

(Concluded on page 1495)

Exports and Imports Both Made Gains in March

For the First Quarter, Exports Were Much Below Those of Same Period in 1930

WASHINGTON, April 28.—Aggregating 109,512 gross tons, exports of iron and steel from the United States in March reflected a gain of 18,300 tons, or 20 per cent, over those in February. Imports rose to 40,401 tons, a 44 per cent increase.

In the first quarter, however, exports declined to 293,469 tons from 659,320 tons in the corresponding period of last year. Imports in first quarter amounted to 109,227 tons, against 143,568 tons in the first quarter of 1930, a drop of 24 per cent.

Gains in March exports over February were, with one or two exceptions, of relatively small importance, but were consistent throughout the list. The largest increase was in

scrap, which rose to 16,946 tons from 10,690 tons. The greatest increase in finished steel was in plain structural material, exports of which amounted to 11,440 tons, compared with 8514.

Skelep shipments increased 2374 tons, the entire movement of 7318 tons going to Canada. The largest decline was in rails, whose exports dropped to 3724 tons from 5133 tons.

Of the scrap shipments, Canada took 11,031 tons; Poland, 2550 tons; and Japan, 2426 tons. Of the 6243 tons of plates exported, Canada took 5173 tons. That country took 4738 tons of the 7973 tons of black steel sheets exported. Japan was the largest consumer of tin plate exports in March, taking 2247 tons of 8522 exported.

Taking 55,750 tons of American exports in March, shipments to Canada represented just over 50 per cent of the total movement. Japan ranked second, taking 8225 tons.

The largest gain in imports in March was in pig iron, which increased to 7357 tons from 3456 tons. Imports of structural shapes increased 2597 tons, while incoming shipments of merchant bars gained 1701 tons.

Of the 3944 tons of concrete reinforcements imported, 2207 tons came from Belgium, 976 tons from France and 761 tons from Germany. Of the 6938 tons of structural shapes imported, 3593 tons came from Belgium, 2464 tons from Germany, 450 tons from France and 425 tons from the United Kingdom. Of the 5133 tons of merchant bars imported, 2321 tons came from Belgium, 1028 tons from the United Kingdom, 1026 tons from France and 567 tons from Germany.

Imports of merchant steel bars from the United Kingdom exceeded by 54 tons our exports of that product to that country. Belgium was the largest source of March imports, supplying 11,979 tons.

Exports of Iron and Steel from the United States

(In Gross Tons)

	March		Three Months Ended March	
	1931	1930	1931	1930
Pig iron.....	324	1,742	1,349	5,772
Ferromanganese.....	.....	1,394	13	1,603
Scrap.....	16,946	49,679	37,039	155,891
Pig iron, ferroalloys and scrap.....	17,270	52,815	38,392	163,266
Ingots, blooms, billets, sheet bar.....	462	2,101	1,565	8,451
Skelep.....	7,318	17,001	20,219	26,835
Wire rods.....	3,594	4,684	10,205	12,538
Semi-finished steel.....	11,374	23,786	31,989	47,824
Steel bars.....	5,823	9,836	14,936	29,718
Alloy steel bars.....	453	1,109	1,654	2,624
Iron bars.....	84	103	252	504
Plate, iron and steel.....	6,243	13,653	13,920	34,541
Sheets, galvanized steel.....	4,805	12,362	12,060	29,869
Sheets, galvanized iron.....	1,002	459	2,154	1,802
Sheets, black steel.....	7,975	13,959	23,111	38,861
Sheets, black iron.....	431	1,195	1,671	3,391
Hoops, bands, strip steel.....	3,778	6,331	11,023	14,779
Tin plate;terne plate.....	8,522	23,000	23,054	69,679
Structural shapes, plain material.....	11,440	16,775	29,288	46,149
Structural material, fabricated.....	3,839	10,227	12,965	32,408
Tanks, steel.....	3,714	2,133	5,968	4,769
Steel rails.....	3,724	8,668	10,121	21,179
Rail fastenings, switches, frogs, etc.....	1,099	1,917	2,048	4,823
Boiler tubes.....	763	1,543	2,193	4,805
Casing and oil-line pipe.....	1,592	8,711	8,041	23,648
Pipe, black and galvanized, welded steel.....	3,467	7,673	11,791	24,697
Pipe, black and galvanized, welded iron.....	561	1,437	1,475	5,994
Plain wire.....	1,101	2,729	3,771	7,698
Barbed wire and woven wire fencing.....	2,163	3,319	7,109	8,636
Wire cloth and screening.....	433	136	597	450
Wire rope.....	272	295	796	1,275
Wire nails.....	670	853	2,209	1,902
Other nails and tacks.....	353	474	1,056	1,663
Horseshoes.....	4	36	8	46
Bolts, nuts, rivets and washers, except track.....	519	977	1,458	3,344
Rolled and finished steel.....	74,828	119,910	204,729	419,254
Cast iron pipe and fittings.....	2,148	5,100	6,879	10,865
Malleable iron screwed fittings.....	489	990	1,757	3,556
Car wheels and axles.....	906	1,621	2,115	3,453
Iron castings.....	489	653	1,537	2,128
Steel castings.....	450	1,293	1,601	2,341
Forgings.....	885	878	2,481	2,753
Castings and forgings.....	5,367	10,535	16,370	25,096
All other.....	673	1,283	1,989	3,880
Total.....	109,512	238,329	293,469	659,320

Imports of Iron and Steel Products into the United States

(In Gross Tons)

	March		Three Months Ended March	
	1931	1930	1931	1930
Pig iron.....	7,357	12,182	21,954	29,477
Sponge iron.....	.....	.....	208	.....
Ferromanganese and spiegeleisen.....	3,022	6,021	8,302	17,326
Ferrochrome.....	21	.....	21	87
Ferrosilicon.....	65	758	373	1,562
Other ferroalloys.....	125	.....	409	.....
Scrap.....	1,348	2,563	3,477	8,260
Pig iron, ferroalloys and scrap.....	11,938	21,524	31,744	56,712
Steel ingots, blooms, billets, etc.....	2,299	1,449	6,519	5,004
Wire rods.....	455	1,355	2,977	3,414
Semi-finished steel.....	2,754	2,804	8,596	8,418
Concrete reinforcement bars.....	3,944	.....	9,991	.....
Hollow bar and drill steel.....	187	3,504	332	9,163
Merchant steel bars.....	5,133	.....	12,852	.....
Iron bars.....	73	185	216	411
Iron slabs.....	.....	.....	.....	.....
Boiler and other plate.....	480	306	563	1,328
Sheets, skelep and saw plate.....	2,362	3,929	5,616	6,921
Tin plate.....	12	6	37	28
Structural shapes.....	6,938	18,102	18,058	39,424
Sheet piling.....	.....	.....	90	.....
Rails and rail fastenings.....	112	721	862	1,418
Welded pipe.....	1,076	379	1,660	1,366
Other pipe.....	866	1,232	3,730	5,126
Barbed wire.....	502	312	1,534	1,384
Round iron and steel wire.....	195	485	758	1,207
Flat wire and strip steel.....	65	129	172	441
Wire rope and strand.....	247	225	492	677
Other wire.....	94	64	229	140
Hoops and bands.....	1,841	1,721	4,648	4,160
Nails, tacks and staples.....	676	444	1,885	1,312
Bolts, nuts and rivets.....	167	22	400	97
Other finished steel.....	11	.....	21	1
Rolled and finished steel.....	24,984	31,769	64,146	74,615
Cast iron pipe and fittings.....	588	366	1,317	3,367
Castings and forgings.....	137	155	424	456
Total.....	40,401	56,618	109,227	143,568
Manganese ore*.....	1,727	30,442	28,734	30,734
Iron ore.....	169,271	301,340	413,486	797,315
Magnesite (dead burned).....	54	3,417	6,440	12,789

*Manganese content only.

†Chromium content only.

‡Silicon content only.



MEETING SHOWS WELDING PROGRESS

THE widening application of welding in all its forms was clearly reflected in the papers and discussion at the annual meeting of the American Welding Society and the American Bureau of Welding (the research department of the society) held last week at the Engineering Societies Building, New York. Not only in more extensive use, but in fundamental investigations—metalurgical, electrical, mechanical and structural—that provide the engineer with design and procedure data, was this progress evident. The meeting included six technical sessions, held April 22-24, at which 12 papers and several committee reports were presented.

E. A. Doyle Reelected President

The annual elections resulted in the renaming of E. A. Doyle, consulting engineer, Linde Air Products Co., New York, and F. P. McKibben, consulting engineer, General Electric Co., Schenectady, as president and senior vice-president, respectively. W. A. F. Millinger, Shell Oil Co., Los Angeles, was elected to serve as Pacific Coast divisional vice-president, and H. C. Price, Welding Engineering Co., Bartlesville, Okla., as Southern divisional vice-president.

Balloting for directors at large resulted in the selection of A. M. Candy, engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh; T. H. Depeler, chief engineer, Metal & Thermit Corp., New York; E. H. Ewertz, consulting engineer, New York; and A. E. Gaynor, John A. Roebling's Sons Co., New York.

Dr. C. A. Adams, professor of engineering, Harvard University, Cambridge, Mass., and president of the Welding Engineering & Research Corp., New York, was reelected director of the American Bureau of Welding, and H. M. Hobart, consulting engineer, General Electric Co., was reelected vice-director. J. H. Critchett, head of research department, Union Carbide & Carbon Research Corp., Long Island City, N. Y., was also elected to the latter office. William Spraragen continues as secretary.

Membership of the A. W. S. as of April 1 stood at 1424, a gain of more than 80 over the previous year, the business depression notwithstanding. New committees appointed during the past year included one to revise

nomenclature, definitions and symbols. The president's report also indicated that the manufacturers' committee of the society has under consideration the advisability of holding an exposition biannually instead of annually as heretofore. The next meeting of the Society will be held in Boston during the week of Sept. 21.

Welded Boiler Drums for Scout Cruisers

THE technical sessions included several outstanding papers, one of which was on "Welded Boiler Drums of the United States Navy Scout Cruisers," by J. C. Hodge, Babcock & Wilcox Co., Barberton, Ohio.

Late last year the Bureau of Engineering accepted fusion arc welded construction for the joints of drums for 24 boilers for the new scout cruisers Minneapolis, New Orleans and Astoria. This pioneer step by the Navy Department, it was held, will be of utmost importance in the final story of the development and adoption of welded construction in all power boilers. It was said to represent the first welded boiler drums and the first welded pressure vessels, built under complete specifications, in which due attention has been given to the welded joints.

The specifications consist of a testing procedure for determining the physical and chemical properties of the weld metal of the joints, and for the determination of the soundness of the welded joints throughout their extent in the drums.

Determination of the physical and chemical properties of the welded joints is made on test pieces attached to the ends of the longitudinal joint and welded at the same time and under the same conditions as the joint in the drum. The soundness of the welded joints, their freedom from major defects, is determined by exploration of the entire length of the longitudinal and circumferential joints by the X-ray method. The specifications, summarized in the paper, embrace the following nine items: Stress relieving (both drums and test plates); tension test; bend test; Charpy impact test; specific gravity of weld metal; chemical analysis; macroscopic and microscopic examination; X-ray examination; and hydrostatic test.

In addition to the 24 boilers for the three scout cruisers named above, orders have been received for eight boilers for a fourth scout cruiser and for six boilers for the aircraft carrier CV4. The boilers are of sectional express type, each boiler for the cruisers having 16 sectional headers and for the aircraft carrier, 12 sectional headers. The working pressure of the boilers is 320 lb. per sq. in. The steam drums, which have the welded joints, measure 47% in. inside diameter, 13 ft. 9% in. long, overall, and 1 7/32 in. thick. The plate used is Class A marine boiler plate.

Tests Show Homogeneity of Weld and Plate

To show the quality of the welded joints in the drums themselves one of the steam drums was constructed of plate of extra length to give a shell from which the excess length of the longitudinal seam could be removed for testing purposes. From this excess length, the tension, bend, impact and other test specimens were taken:

Test data from seven transverse tension specimens showed remarkable uniformity in the values obtained. The average physical properties of plate and weld metal were:

	Plate	Weld Metal
Ultimate strength, lb. per sq. in.	64,775	65,830
Yield point, lb. per sq. in.	40,940	49,200
Reduction of area at fracture, per cent	53.6	53.5
Elongation in 1 in. across fracture, per cent	57.5	47.3

The physical properties of the two steels comprising the welded joint were remarkably similar—clearly indicated by four specimens failing on the plate material and three in the weld metal. This striking homogeneity was also evident from the photographs of the fractured specimens, which show a uniform elongation across the welded joint where failure occurred in the plate.

In discussing the reasons for including a specification governing the chemistry of weld metal, Mr. Hodge referred to a previous paper which showed that the resistance of a weld metal to corrosion could be correlated with the nitrogen content of a weld metal.

An investigation was made to de-

termine the effect of different degrees of protection from atmospheric contamination, all other factors being held constant, upon the properties of the weld metal. Three welds were made, the atmospheric conditions surrounding the arc being so regulated as to produce weld metals with nitrogen contents of 0.058, 0.032 and 0.019 per cent. Tensile and impact specimens were obtained from the three welds. The results, shown by graph, indicate that, all other factors remaining the same, increasing nitrogen content (or increasing atmospheric contamination) causes:

1.—An increase in the proportional limit, the yield point, and the tensile strength of the weld metal, and

2.—A decrease in the ductility criterions, elongation and reduction of area of the weld metal, and

3.—A decrease in the resistance to impact of the weld metal.

X-Ray Examination Necessary

All of the main joints of these navy drums are being X-rayed; in this connection, Mr. Hodge said: "Our experience indicates that X-ray examination of welded joints in boiler drums and other similar high temperature, high-pressure vessels is absolutely necessary to secure best work and vessels of greatest safety."

Of the 24 longitudinal joints of the steam drums, 23 of them complied with the specification without re-welding. One of the joints, however, on X-ray examination showed zones containing defects. The entire longitudinal seam was machined out and the joint rewelded. X-ray examination of this second weld in the longitudinal joint complied with the specifications.

General procedure and standard details which have proved practical in welding machinery foundations in ships were described at the same session by G. H. Moore, Jr., Newport News Shipbuilding & Drydock Co.

Welding Ship Machinery Foundations

At the Newport News yards this welding application has ranged from large boiler foundations, where strength and tying in the main hull structure are of vital importance, to foundations for small pumps or other auxiliaries, which are merely seatings or stools. The welding of main engine foundations has not yet been attempted. It was stated that the welding of machinery foundations has resulted in savings in weight and in cost, and that the assembly and erection are far simpler and easier. Vibration problems are readily solved and little or no trouble is experienced with rapid corrosion.

German Naval Vessels Welded

Capt. Hermann Lottmann, in charge of construction Wilhelmshaven Navy Yard, Wilhelmshaven, Germany, who has been in the United States for the past few weeks, was a guest of the Society at this shipbuilding session.



E. A. Doyle



W. Spraragen



Dr. C. A. Adams

Mr. Doyle, president of the A. W. S., is consulting engineer Linde Air Products Co. and Dr. Adams, director of the A. B. W., is Lawrence professor of engineering Harvard University and president of the Welding Engineering & Research Corp. Mr. Spraragen is technical secretary of the A. W. S. and secretary of the A. B. W.

He has had extensive experience in ship welding in connection with the 12 destroyers and three 500-ft. cruisers, most all the joints of which were welded. About 100 gas welders and cutters and 200 arc welders are employed at the Wilhelmshaven yard. The cost of the welded ship was said to be about 3 per cent less than the riveted construction.

"We are entirely satisfied with welding as a method of constructing ships, and will never go back to riveting," he said. Capt. Lottmann indicated also that the development of merchant ship construction would be along the same line.

Examples of Welding in Canadian Structural Shop

DESIGN methods used in welding a large variety of structural steel connections were given in a paper on "Some Examples of Welding in Structural Steel Work," by D. C. Tennant, structural engineer Dominion Bridge Co., Ltd., Montreal, Canada.

One of the most important aspects in fusion welding, he pointed out, is the increasing use made of it, especially the arc process, in structural steel fabricating shops. "Our company does not deliberately set out to sponsor either welding in general or any particular type of it; but it does constantly try to find means of attaining good results by new and more economical means, and also better results at a justifiable increase in expense. One of our aims is to introduce new methods wherever it pays us and not otherwise," Mr. Tennant said.

In the plate and tank shop, a great deal of the lighter work is now entirely welded. In heavier work, such as penstocks, where plates up to 1½ in. thick are used, welding is used sometimes instead of caulking, the

strength being supplied by riveting and the watertightness by the welding. Welding replaces riveting on pontoons, caustic liquor tanks, gasoline tanks, water tanks, evaporators and many other watertight vessels. Y-connections in penstocks have been simplified by welding.

Shaft brackets are made by welding together bent plates and then machining. End trucks for cranes are also built up by bending, welding and machining structural plates. A crane of all-welded construction has given satisfactory service for three or four years. Welding has also been used to advantage on hydraulic gates.

In addition to the plate and mechanical work, the Montreal shop also fabricates steel for bridges and buildings of all sorts, coal towers, conveyors, outdoor substations, transmission towers, head frames, elevators, fences, draft arms and other work, the whole list being referred to as structural work. It is the application of welding in this field that most invites the attention of the structural man, said Mr. Tennant.

Welding applications described included welded crane columns, welded pier members, diaphragms at hip joints, crane runway beams, welded connections for jib crane trusses and a patented truss for buildings.

In regard to the use of welding in building work in general, it was said to have been found difficult to lay down any rules or standards that can be used in the drawing office and the shop as readily as were the tables of standard beam connections, column



brackets, column splices, bases and caps that have been in vogue for riveted construction. "We have a committee working on such welded details and we believe the work of our committee will be very valuable in stimulating welding thought along right lines and emphasizing the principles to be followed in the various details," said Mr. Tennant. "Yet we think each welded structure as it comes up deserves individual engineering to suit any special conditions that may exist, and it will be some time yet before the details of any one welded job will be likely to conform to set standards."

Structural Steel Research Report Being Compiled

A progress report was submitted by the A. B. W. structural steel welding committee, headed by L. S. Moisseiff, Welding Engineering & Research Corp., New York. The committee has drafted a preliminary report of the 1400 tests made on structural steel welded joints. Three rolling mills supplied the steel, 39 fabricating shops made the welded joints and 24 different laboratories tested the welded specimens.

H. M. Priest, engineer, American Bridge Co., New York, presented for comment the methods followed in assembling and tabulating these comprehensive test data. A draft of the report is to be submitted to the structural steel research committee during June, and when the draft is in final form, it will be submitted to the American Welding Society. It is expected that the final report will be ready for printing before the next meeting of the A. W. S.

In this comprehensive investigation, probably the most thorough in its field, the purpose of the committee is to provide data for the structural engineer, data that will facilitate the design of a good welded structure using average operators for the welding.

Thermit Welding in Steel Mill Maintenance

INCREASING use of the Thermit process in steel mills, not only for emergency repairs but for building up worn parts and even in manufacture of new constructions, was emphasized in a paper on "Thermit Welding and the Steel Mill," by J. H. Deppeler, chief engineer, Metal & Thermit Corp., New York.

In discussing the degree of assurance that the operator is making every weld sound, Mr. Deppeler stated that elimination of defects in Thermit welds was aided by a condition inherent in this form of welding, namely that the weld solidifies from the inside toward the outside, which tends to promote density and soundness in the weld itself. Before this fact was thoroughly realized, it was customary to use large risers with the idea that shrinkage of the inner portions of the weld would have to be fed. These

large risers were not only wasteful but actually harmful.

The reason for this difference in shrinkage as compared with ordinary foundry practice was explained as follows: In the foundry the heat from the molten steel passes out slowly through the mold and solidification of the casting occurs first on the surface in contact with the mold and progresses toward the core of the casting. In the welding operation the parts being welded act as enormous chills in the casting and extract the heat of the steel more rapidly from the center or core than from any other point. Freezing occurs, therefore, first approximately along the axis of the parts and radiates outward from this point.

From this, and the conclusion that large risers were harmful rather than helpful, followed a radical change in the design of welds. This, in greatly lowering the cost, has increased the application of this form of welding.

In former years steel mill applications of the Thermit process were confined almost entirely to emergency repairs, using outside welders. Today, however, mills have their own welding departments, which handle both emergency and routine repairs. Such repairs include mill housings, wabblers ends of rolls and pinions, machine frames, gear teeth, crankshafts and many other parts. The work also includes the building up of worn parts with wear resistant metal; in this, it was said to be common practice to select Thermit steels which are so hard as not to be machinable, the weld being made so true to size that no machining is required.

Wearing Surfaces Built Up

It was said to be feasible to make wabblers ends of a steel offering the greatest possible wear resistance and to Thermit weld such wabblers ends to the necks of ordinary rolls. In the same way new charging peels can be kept on hand which can be welded as required to replace broken or worn ends. Thermit welds of extreme hardness may be cast on surfaces subject to wear; in fact any parts may, by means of welding, be designed to have different physical properties at different points. The process also permits elimination of intricate castings and substituting simple forgings that can be welded together. A large steel company in making frogs for track work uses a steel casting for a center plate and Thermit welds to it arms of rolled steel rail.

Coordination of the various departments of steel mills in welding work was emphasized. Rather than have a number of independent welding departments in one plant, some mills have organized a reclamation department, the head of which, together with the mill superintendent interested, has the final say as to which broken or worn parts should be scrapped or reclaimed.

The principles of resistance weld-

ing, with particular reference to non-ferrous metals, and some interesting applications of this process at the Hawthorne plant of the Western Electric Co., were outlined by C. L. Pfeiffer, engineer in charge of welding development, Western Electric Co.

Four important considerations in the design of welded apparatus assemblies were said to be: Type of joint; choice of material; shape at the point of welding; and accessibility of electrodes.

In choosing the type of joint every effort should be made to provide a perfectly balanced spot or butt weld. This will usually simplify every subsequent consideration, the most important of which is the choice of material. If it is necessary to use a hybrid joint (one in which the material is backed by a spot welding electrode and the other piece of material is gripped by a butt welding electrode) care should be exercised to avoid extremes.

In speaking of materials it was said that the first consideration is the fusibility of the material. This is most easily determined by experimental butt or spot welds. For welds that join dissimilar materials or are hybrid in nature a close inspection should be made of the heat and electrical conductivity and the melting points. Study of these characteristics will help one establish at least a near heat balance so that opportunities for perfect fusion are greatest.

Shapes of the parts being welded and accessibility of the electrodes are closely related in welded apparatus design. The shape of the parts determines the type of weld to be employed which should be such that the joining process makes possible an easy heat balance. In order not to hamper production the electrodes must be made easily accessible to the point of fusion, even if this makes a heat balance more difficult. The parts and the welding fixture should be designed so that the electrodes may be easily trimmed or replaced, and, if possible, to permit the use of standard designs.

In all welding operations the presence of grease, dirt, scale or other foreign material causes trouble. Parts should be designed so that they may be dipped in cleaning solutions, tumbled or sand blasted. This speeds up production.

Gives Data on Welding Copper Alloys

The wide range of application of resistance welding was brought out in the discussion of this paper. Machines are made for very small work such as the welding of wires on radio tubes up to very large machines, units as large as 6500 kva. now being obtainable. Spot welding of two pieces of steel $\frac{1}{2}$ in. thick is being done successfully.

Results of investigation to determine the fitness or the unsuitability of

(Concluded on page 1495)



BREAD AND MILK

ADVOCATES of general wage reductions who base their argument on increased purchasing power due to price declines would do well to consider the price of bread and milk. In spite of the wheat surplus, there has been no very noticeable reduction in the retail cost of a loaf of bread. Evidently American cows are depression proof, too, for there has been no weakening in milk, from the price standpoint.

These exceptions to the general rule are hard to explain to those who are asked to take wage rate cuts.

A WORTHWHILE JINGLE

CARL A. JOHNSON, president, National Machine Tool Builders' Association, introduced a timely and effective two-line jingle in his radio response to the Westinghouse salute to the machinery industry:

"Old machinery in the shop
Means obsolescence at the top."

This little verse will "catch on" because it embodies a truth that is undeniable. But works managers who want new equipment are not advised to spring it on their boards of directors. Truth hurts, sometimes.

HOLDING THE BAG

AUTOMOTIVE industry has made remarkable reductions in inventory since the beginning of the retrenchment period. That is good business, because it reduces the investment in raw materials. But some of the suppliers to the industry say it is not so good, since the concerns which sell the automobile makers have been forced to carry the inventory.

For example, a car builder orders 50,000 forgings for the first

quarter's requirements. Supplier bases his price on a 90-day turnover and orders the material. Releases on purchase order are held up by car builder whose sales quota has not materialized. Result, three months' deliveries aggregate 25,000 forgings instead of 50,000. The supplier holds the inventory bag for the maker in this case.

This hold-over of material on uncompleted purchase orders is said to be causing much concern to many automotive suppliers.

RUSSIA CUTS DOWN

RUSSIA is cutting down on American machinery orders and is buying from Germany instead. Some say this is in reprisal for our national attitude toward sovietism. A more simple explanation is that the Russian collective pocketbook is feeling the pinch. And our machinery builders are not willing to extend long-term credits. Perhaps the cutting down is the other way around!

LARGE PROJECTS

DEPARTMENT of Docks, New York, secured \$17,000,000 for five new piers on North River, to be equipped with loading and handling equipment.

Shamrock Oil & Gas Co., Pittsburgh, plans \$6,000,000 natural gas line from Amarillo, Tex., to Fort Worth.

International Sugar Co., San Francisco, to build new \$1,000,000 refinery near Los Angeles.

Construction Quartermaster, U. S. A., Scott Field, Belleville, Ill., will draw plans for hangars, repair shops, etc., to cost \$3,000,000.

TURNOVER

NORMAN H. PREBLE, of Jervis B. Webb, Detroit, stated at Birmingham meeting of A.S.M.E. that no automobile plant would be satisfied if its turnover were less than 24 times a year. When General Motors took over Frigidaire, its turnover was six times; now it is 30 per year. Conveyorized production plus good management secured these results.

MACHINERY EXPORTS

ALTHOUGH our exports of machinery have dropped 4 per cent during the past year, the United States still holds top place in machinery world markets. Germany, however, according to German Federation of Machinery Manufacturers, is making progress toward the position of leadership that she held in 1913. Germany picked up the 4 per cent that we lost in 1930, and now stands in second place with 28.9 per cent of the world's machinery exports against our 31.8 per cent. Russian orders probably account for much of Germany's gain.

DEPRESSION ACCIDENTS

"ACCIDENTS are most likely to occur during times of depression, when workmen value their jobs most," said David S. Anderson, safety manager of Sloss-Sheffield Steel & Iron Co., at the Birmingham convention of the A.S.M.E. "In such times many workers become timid and nervous, have fears of becoming discharged and are incapable of using their best judgment."

This seems logical, and calls for intensified managerial precautions during such periods.

Steel Castings Industry Sees Fairly Favorable Prospects

At Pittsburgh Meeting Only Thirteen Producers, Representing 15.7 Per Cent of Capacity, Considered Outlook Poor

A FAIR outlook for business in the steel castings industry was predicted in the March-April report of the members of the Steel Founders' Society of America, Inc., which was made public at a meeting of the society held in Pittsburgh on April 22 to 24. Of the 60 companies reporting, five, representing 23.2 per cent of the total capacity included, considered the business outlook good; 42 companies, representing 61 per cent of capacity, considered prospects fair, and 13 producers, making up only 15.7 per cent of capacity, considered the outlook poor.

Slightly more than half the companies reporting were operating at less than 50 per cent of capacity, with the remainder ranging up to 100 per cent. Bookings were scarcely so good, with 38 companies, representing 62.2 per cent of the capacity reported, indicating new orders at less than 50 per cent. Inquiries were generally steady, with 33 companies, representing 65.8 of the members' capacity, so reporting. Increased bookings were indicated by companies representing 22.8 per cent of capacity, while only 11.4 per cent of the capacity reporting showed a decrease.

Competition with Welding

Activity of the society in attempting to eliminate unfair and prejudicial publicity on the part of manufacturers of welded products and welding equipment to the detriment of the steel castings industry was outlined in a report by Granville P. Rogers, managing director of the society. Mr. Rogers was able to report that cooperation between the society and manufacturers of welding equipment had been obtained in eliminating unethical publicity and false claims which are adverse to cast steel. Through continued efforts, it is hoped that development of new markets for many products made of cast steel in which the welding process is utilized may be had.

A questionnaire sent to the steel foundries of the country revealed that only 12 per cent consider welding a serious competitor. Only 23 per cent believe that welding may become seriously competitive to the steel foundry industry. The majority think welding will enjoy a normal growth and will have a legitimate field of application in the foundry industry, while 25 per cent of the foundries replying to the questionnaire expressed other ideas. It was reported that business in cast

steel has been lost to welding in a number of instances, but on other occasions this business has been returned to cast steel.

Mr. Rogers brought the report to a close with a plea to steel foundries to utilize welding as a means of expanding their market. He stated that steel castings may be welded together in many cases to form complicated structures which are impossible to produce by any other method.

In briefly reviewing the other activities of the society since the last meeting, Mr. Rogers stated that a compilation had been made of specifications for manhole frames and covers, in which reasons why cast steel should be included are set forth. Investigations of the comparative value of cast and forged steel for railroad car center plates have also been conducted and presented to members of the society. Survey work includes a tabulation of gas rates and costs for steel foundries in various centers of the industry and a compilation of tax data and financial information for the use of members. The society has also continued its activities in preventing unwarranted expansion of foundry capacity, principally in the establishment of new foundries.

It was also announced that the first meeting of the engineering and metallurgical division of the society will be held at the mid-summer convention at French Lick, Ind., on June 16 to 18.

C. S. Eaton's Holdings Transferred; Retains Place on Sheet & Tube Board

THE withdrawal of Cyrus S. Eaton and his associates in Otis & Co., Cleveland and New York banking house, from some of their financial interests, including Continental Shares, Inc., their principal holding company, announced on Monday, was thought to have indicated the complete severance of Mr. Eaton's interest in steel companies, and there were suggestions that new directors of the Youngstown Sheet & Tube Co. would be elected to succeed those who represented the so-called Eaton interests. At the meeting on Tuesday of the Sheet & Tube company, the Eaton representatives were reelected, however, giving rise to the conjecture that Mr. Eaton may still exert some influence in the affairs of that company and others in which he held large financial interest, particularly the Republic Steel Corp., control of which has been in his hands prior to the Republic merger early in 1930.

There have been intimations in financial quarters that the sweeping realignment of Mr. Eaton's interests, by which control of Continental Shares passed to four Cleveland banks, would result in a settlement out of court of the suit over the proposed merger of the Youngstown Sheet & Tube Co. with the Bethlehem Steel Corp. No statement is obtainable as to whether the reelection of the Eaton directors on the Sheet & Tube board indicates that an amicable settlement of the controversy has been reached or is in sight.

Continental Shares, which was organized about five years ago, has an investment of about \$40,000,000 in the steel industry, principally in the

Cliffs Corp., the Youngstown Sheet & Tube Co. and the Republic Steel Corp. and Mr. Eaton is also a director of the Inland Steel Co. According to a statement issued on Monday, it was deemed advisable to make a complete change of directors. Mr. Eaton, who was chairman of the board, and W. R. Burwell, president, resigned and new officers and directors have been elected. Four of the leading banks of Cleveland are now prominently represented on the board.

The four directors on the board of the Youngstown Sheet & Tube Co., who are considered as the Eaton representatives, are Mr. Eaton, himself, George C. Brainard of Youngstown, Hugh B. Wick of Cleveland and S. Livingston Mather of Cleveland. The last named, although generally considered to favor the Eaton interests, took a neutral position in the matter of merging with Bethlehem.

Malleable Castings Make Slight Gain

WASHINGTON, April 28.—Bookings of malleable castings totaled 33,855 tons in March, compared with 32,566 tons in February, according to reports received by the Bureau of the Census from 115 establishments. Production amounted to 35,039 tons, or 35.8 per cent of capacity, against 33,587 tons, or 34.4 per cent of capacity, while shipments were 36,467 tons and 32,663 tons respectively.

In the first three months of 1931, orders were 99,097 tons, against 180,530 tons in the first quarter of 1930.

"Replacing Obsolete Equipment Will Break Vicious Circle"

Says Carl A. Johnson, in Response to Westinghouse Salute to Machinery Industry

ON Sunday evening, April 26, a salute to the machinery industry was broadcast over a radio network of 29 stations by the Westinghouse Electric & Mfg. Co., East Pittsburgh. The program pointed out to a large radio audience the fact that machinery benefits all classes of people, whether as consumers, workers or stockholders.

Carl A. Johnson, president of the National Machine Tool Builders Association, responded by invitation of the program sponsors. His address, which emphasized the necessity of equipment modernization as a basic step toward the restoration of prosperity and the elimination of excessive unemployment, follows:

"I am glad that this Westinghouse salute to the machine industry permits me to discuss a subject which affects American progress.

"If the manufacturers of America could honestly say today, 'We are buying now,' they would not need to say to their consumers 'Buy now,' and the clouds of depression would soon pass away.

"There is a way by which American industry could start a series of buying movements with profit to itself, thereby giving employment to hundreds of thousands of men now out of work and taking effective steps toward the breaking of the 'vicious circle' of delayed purchases.

"Replace with modern, improved machinery the obsolete, out-of-date machinery now being used for production.

"The need for such replacement is shown by the proved fact that 48 per cent of all metal-working machinery in this country is over 10 years old, and, generally speaking, machinery 10 years old is out-of-date.

"A machine becomes out-of-date just as soon as another machine is developed that will do more or better work.

"You would not buy for your own use a radio, automobile or tire made 10, or even five, years ago at the original price, even if it were perfectly new, because you know you can get very much better service from up-to-date models.

"How much more important is it for you as an employee, a stockholder, an officer, or a creditor of a company using machinery that your company's plant equipment be of the most modern character.

"It costs more to use an obsolete

machine than it costs to buy a new one. Hence, the user of obsolete machinery pays for the new machine in waste, but neither he, nor his workers, nor his stockholders get the benefit.

Machinery Multiplies Jobs

"It has been conclusively shown, many times over, that time-saving machinery raises wages, creates more jobs, and makes available a greater choice of jobs for this and for each succeeding generation of workers. We have, in fact, attained our present standards of living only by the thoroughly American process of constantly improving our machinery, and we can maintain and improve these standards only by rigidly adhering to this policy.

"It has been the practice in most industries for the works manager to

ask his management for new machines and be compelled to argue for them. The roles should be reversed. Pressure for the replacement of out-of-date machinery should come from the management down and not from the works up.

"At least once a year management should procure a list of machines in use, classified by age. Then the works managers should be compelled to prove that any machine over 10 years old can still be profitably used. This simple procedure would disclose some startling leakages of money in almost every plant.

"Since a plant equipped with modern machinery is better security for loans than an obsolete plant, bankers have begun to inquire into the condition of a plant's equipment with the same care they now give to its financial statement.

"A management keeping obsolete machinery too long in service will in time find itself at the mercy of an up-to-date competitor. Hence, stockholders are also deeply interested in this same subject.

"This little jingle I heard recently is truly a constructive slogan for all American industry:

'Old Machinery in the shop
Shows obsolescence at the top.'

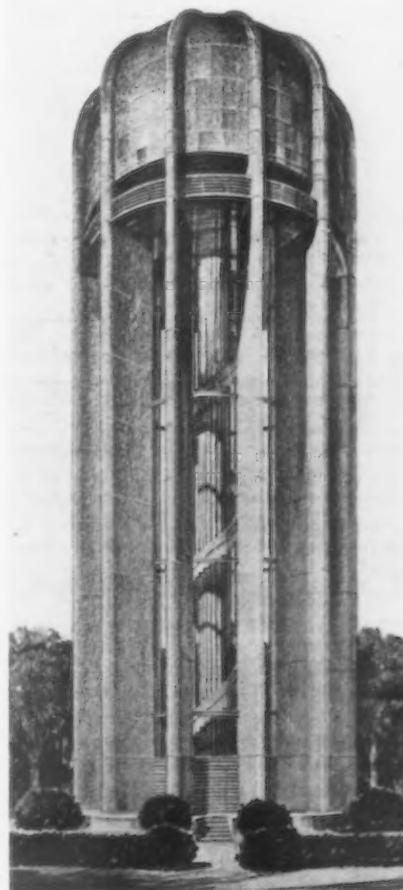
Elevated Tank Designs Win Cash Prizes

The Chicago Bridge & Iron Works, Chicago, has announced awards of prizes for the best designs of elevated water tanks. The first prize of \$2,000 was won by Eugene Voita, 837 North Lorel Avenue, Chicago; the second prize of \$1,000 was awarded to F. D. Chapman and C. M. Goldman, 207 Main Street, Evanston, Ill., and the third prize of \$500 went to Howard W. Vader, 333 North Michigan Avenue, Chicago. Prizes of \$100 each, with honorable mention, were awarded to five others.

The jury of awards consisted of R. W. Zimmerman, architect; Howard L. Cheney, president of the Chicago chapter, American Institute of Architects, and George T. Horton, president, Chicago Bridge & Iron Works.

The company states that 152 drawings were offered in competition, some of them so unusual that the company is led to believe that they will result in a drastic change in design of elevated tanks to be constructed throughout the country.

The drawings will be on public exhibition for two weeks commencing April 27, after which date other exhibitions will be held at a number of universities and architectural schools.



First prize winner in elevated tank designs.

The Iron Age, April 30, 1931—1467

New Base Prices for Sheets Announced Under New Plan

Sheet Manufacturers Generally Are Expected to Follow American Rolling Mill Co. Classification

THE American Rolling Mill Co., Middletown, Ohio, on Tuesday announced new base prices on cold-rolled sheet steel, effective May 1 under the new plan of classification of grades published in THE IRON AGE of April 23.

Heavy cold-rolled sheets, No. 16 gage and heavier to No. 10 gage, 2.35c. a lb., Pittsburgh. Cold-rolled sheets, No. 17 gage and lighter to No. 20 gage, 2.95c., Pittsburgh.

Heavy furniture sheets, No. 16 gage and heavier to No. 10 gage, 2.75c., Pittsburgh. Furniture sheets, No. 17 gage and lighter to No. 20 gage, 3.35c., Pittsburgh. (Prices on furniture stock include stretcher leveling but no resquaring.)

Automobile body sheets, No. 20 gage, 3.10c., Pittsburgh.

Vitreous enameling sheets, No. 16 gage and heavier to No. 10 gage, 3.10c., Pittsburgh. No. 17 gage and lighter to No. 20 gage, 3.60c., Pittsburgh.

The usual differential of \$2 a ton over Pittsburgh prices applies on all of these grades at Chicago.

The American Rolling Mill Co. has not yet announced base prices on hot-

rolled sheets, but these probably will be made known in a few days. It is said to be probable that the base price for No. 24 gage hot-rolled annealed sheets will be about 2.40c. to 2.50c. a lb., Pittsburgh.

It is expected that the new sheet steel classifications will be generally adopted by other sheet manufacturers, although the majority have taken no action yet. However, the Newton Steel Co., Youngstown, informs THE IRON AGE that it has decided to adopt the plan, and it is known that other manufacturers have it under consideration. Large sheet consumers, such as the automobile companies, are said to have received the announcement favorably, recognizing the need of some clarification of the confusion that has crept into sheet steel selling, and are prepared to assent to the new set-up.

The gage differentials under the new classification, as announced by Armco, are printed below.

HOT-ROLLED SHEETS

24 to 48 in. wide inclusive,
10 gage base.

Gage No.		Differential per 100 Lb.
8 and heavier	Deduct	\$0.05
9-10	Base	Base
11	Add	0.05
12	Add	0.10
13	Add	0.15
14	Add	0.20
15	Add	0.25
16	Add	0.30

Annealed (blue annealed or box annealed) 15c. per 100 lb. extra.
Extra smooth 25c. per 100 lb. (applicable to box annealed unpickled sheets only).

Hot-rolled sheets are the product from continuous mill, without any tempering treatment, and can be used for ordinary forming.

When annealed sheets (box annealed or blue annealed) are required, or when sheets wider than 48-in. are needed, it will be necessary to make them on other than continuous mills and require process annealing, the extra for which is 15c. per 100 lb. Also when less than 5 tons per item are required, it will be necessary to make such tonnage on sheet or jobbing mills and since it must be further annealed, the 15c. per 100 lb. extra will be added.

HOT-ROLLED ANNEALED SHEETS

24 in. and wider,
24 gage base.

Gage No.		Differential per 100 Lb.
17	Deduct	\$0.35
18	Deduct	0.30
19	Deduct	0.25
20	Deduct	0.20
21	Deduct	0.15
22	Deduct	0.10
23	Deduct	0.05
24	Base	Base
25	Add	0.05
26	Add	0.10
27	Add	0.15
28	Add	0.20
29	Add	0.25
30	Add	0.30

Extra smooth, 25c. per 100 lb. extra (applicable to unpickled sheets only).
Deoxidizing, 15c. per 100 lb. extra.

EXTRAS FOR HOT-ROLLED AND HOT-ROLLED ANNEALED SHEETS

	Pickling	Dry	Oiled
12 ga. and heavier	\$0.25 cwt.	\$0.25 cwt.	
13 to 16 gage	0.25 cwt.	0.35 cwt.	
17 to 21 gage	0.35 cwt.	0.45 cwt.	
22 ga. and lighter	0.45 cwt.	0.55 cwt.	
Drawing			
12 ga. and heavier	0.15 cwt.	0.25 cwt.	
13 to 21 gage	0.25 cwt.	0.35 cwt.	
22 ga. and lighter	0.35 cwt.	0.45 cwt.	
Stretcher leveling	0.25 cwt.		
Oiling	0.10 cwt.		

Resquaring—5 per cent of price of processed sheets.

HEAVY COLD-ROLLED SHEETS

24 in. and wider,
16 ga. and heavier,
10 ga. base.

Gage No.		Differential per 100 Lb.
8 and heavier	Deduct	\$0.05
9-10	Base	Base
11	Add	0.05
12	Add	0.10
13	Add	0.15
14	Add	0.20
15	Add	0.25
16	Add	0.30

COLD-ROLLED SHEETS

24 in. and wider,
17 ga. and lighter,
20 ga. base.

Gage No.		Differential per 100 Lb.
17	Deduct	\$0.15
18	Deduct	0.10
19	Deduct	0.05
20	Base	Base
21	Add	0.05
22	Add	0.10
23	Add	0.15
24	Add	0.20
25	Add	0.25
26	Add	0.30
27	Add	0.35
28	Add	0.40

HEAVY FURNITURE SHEETS

Stretcher Levelled Not Resquared,
24 in. and wider,
16 ga. and heavier,
10 ga. base.

Gage No.		Differential per 100 Lb.
10	Base	Base
11	Add	\$0.05
12	Add	0.10
13	Add	0.15
14	Add	0.20
15	Add	0.25
16	Add	0.30

FURNITURE SHEETS

Stretcher Levelled Not Resquared,
24 in. and wider,
17 ga. and lighter,
20 ga. base.

Gage No.		Differential per 100 Lb.
17	Deduct	\$0.15
18	Deduct	0.10
19	Deduct	0.05
20	Base	Base
21	Add	0.05
22	Add	0.10
23	Add	0.15
24	Add	0.20
25	Add	0.25
26	Add	0.30

AUTO BODY SHEETS

24 in. and wider,
20 ga. base.

Gage No.		Differential per 100 Lb.
17	Deduct	\$0.15
18	Deduct	0.10
19	Deduct	0.05
20	Base	Base
21	Add	0.05
22	Add	0.10

Extras for Cold-Rolled Auto Body Sheets and Furniture Sheets

Drawing:	
12 ga. and heavier	\$0.15 cwt.
13 to 21 gage	0.25 cwt.
22 ga. and lighter	0.35 cwt.
Stretcher leveling	0.25 cwt.
Oiling	0.10 cwt.
Resquaring—5 per cent of price of processed sheets.	

Seconds

To Be Supplied on Prime Auto Body and Furniture Sheet Orders.

36 in. wide and under	0.035 to 0.024	25 per cent
36 in. wide and under	0.036 and heavier	15 per cent
Over 36 in. to 42 in. wide	0.036 and heavier	20 per cent
Over 42 in. to 48 in. wide	0.036 and heavier	25 per cent
Over 48 in. to 56 in. wide	0.036 and heavier	35 per cent
Over 56 in. wide	0.036 and heavier	50 per cent



Eastern Steel Plant Sold to Bethlehem

The Bethlehem Steel Corp. has acquired the bonds and all of the properties of the Eastern Steel Co. of Pottsville, Pa., from Alexandria Luria of Luria Brothers & Co., Reading, Pa., scrap firm, who bid in the buildings, equipment and stocks of material at public auction early last week.

Approval of the sale is still to be made by the Federal District Court, Philadelphia, but as soon as this is secured the Bethlehem company will take over the property and dismantle it. Such of the rolling mills as are in condition for further service will be moved to other plants of the Bethlehem Steel Corp. and other equipment will be scrapped. The real estate and buildings probably will be offered for sale for other manufacturing purposes.

The Bethlehem company states that it has determined that the Eastern Steel Co. cannot be profitably operated in its present location.

OFF THE ASSEMBLY LINE



May Automobile Output Likely to Equal That of April

DETROIT, April 27.

DEVELOPMENTS in the past week substantiate the impression that the next 30 days is likely to bring little change in automobile production. It is an encouraging commentary that several companies, including Chevrolet and the Chrysler organization, have been compelled to step up April operations since the middle of the month in response to retail demand. Chevrolet is now employing 34,000 men and practically all departments are working five and a half days a week. Sales in the Detroit area have been so brisk that the assembly line at Flint, which supplies dealers in this district, has run for the past two weeks on Saturday afternoons.

Chevrolet's output this month is estimated at 90,000 to 100,000 units, with approximately the same schedule for May. Ford's April assemblies probably will be in the same range. There have been reports to the effect that Ford will close the Rouge plant for two months this summer, but these have been vigorously denied by the Ford company and are generally discredited in the trade. Those familiar with the situation point out that Ford, like every other maker, is holding production in line with current retail needs, and production is sensitive to every change in retail conditions. Consequently what Ford's activities will be in midsummer will be regulated at the time by its dealers' sales. It can be stated positively that no shutdown for two months is contemplated.

Aside from the two leading manufacturers, the industry is continuing at about the rate attained early in the month. Buick should turn out some 13,000 cars in April, Chrysler-owned companies 31,000, Willys-Overland and Oakland-Pontiac 12,000 each,

Oldsmobile 6500, Studebaker 7500, Auburn-Cord 6000, Hudson-Essex 10,000, Cadillac-LaSalle 3000, Packard 1900. Production by other companies should raise the total for the month to a minimum of 330,000 cars, unless there should be an unexpected slump in Ford's figures.

Steel Buying Not Increasing

THERE has been practically no fresh buying of steel by the automobile industry in the past week. In most cases releases on current contracts have been fairly good, but tonnage in the aggregate has been reduced by the lessened demand from one large automobile maker, which likewise has pared its orders for parts. Some steel companies declare that their bookings in this district for April compare favorably with March, but

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Automobile production is expected to hold at or near the present level during the next 30 days.

* * *

There has been practically no new buying of steel the past week by the automobile industry.

* * *

Motor car makers made poor financial showing in first quarter. With exception of Auburn, General Motors' earnings, at 61c. a share, were perhaps the best.

* * *

Large users of sheet steel in automobile industry are said to regard with favor the change in designation of various grades, effective May 1.

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others report a lessened volume this month. Pig iron shipments to the automotive trade have fallen off and now it looks as though the best to be expected is an April tonnage equal to that in March.

Periodically the question of a Detroit base on sheets and other steel products made in this district is thrust into the foreground. The latest report is that two mills near by have made prices to large buyers in the automobile industry equivalent to the Pittsburgh price plus the switching charge in Detroit. This, in substance, would be setting up an "f.o.b. Detroit" schedule. It can be authoritatively said that while local mills have consistently sold on the basis of a price delivered in Detroit, they have not resorted to an "f.o.b. Detroit" practice. It is true that in many instances the delivered price is less than the established quotation at Pittsburgh plus the all-rail rate from Pittsburgh to Detroit, but this is not surprising or even a new development in view of the constantly increasing percentage of steel brought into Detroit by water or by a rail-water route at a considerably cheaper cost than the all-rail charge. Some automobile companies have exerted pressure to obtain a Detroit price equal to the Pittsburgh price, but others have indicated their willingness to go along for some time without pushing for this advantage. It is estimated that a Detroit price on the same level as prevailing quotations at Pittsburgh would cost the manufacturers of light-rolled steel products \$12,000,000 to \$15,000,000 a year. A sizable share of this loss would have to be borne by Detroit district mills, and it stands to reason that they do not want to see this brought about any more than the makers outside this area do.

There is still another angle to the

situation. Local mills have capacity to supply only about 15 per cent of the light-rolled steel used in the automobile industry, and outside interests would work strenuously to prevent this relatively small minority of makers from forcing such a policy on the other 85 per cent. It is freely admitted that if steel capacity at Detroit is increased by the construction of new steel plants—a development which is looked upon as inevitable as soon as the time is ripe—a Detroit base on products rolled by district mills will be established. However, it is not likely to be equivalent to the Pittsburgh price, but will command a differential, just as at Chicago, of perhaps \$2 to \$3 a ton. Just when this may occur is impossible to say, but it is safe to predict that it will not be a development of the immediate future.

The new nomenclature of sheets to be introduced by the American Rolling Mill Co. on May 1 is said to be looked upon with favor by large sheet users in the automobile industry. Announcement of the change has created much interest among buyers, who are cognizant of the fact that some move toward stabilization of the present situation is badly needed. Many automobile companies are covered through the second quarter on current contracts, and consequently the new plan will not become fully operative until the third quarter.

Water Shipments Gaining

A LOCAL mill has dispatched the first water shipment of steel to the Oshawa, Ont., plant of General Motors of Canada, thereby saving a considerable amount in transportation costs. Substantial shipments of

steel by water are reaching this city from Chicago, Cleveland and Buffalo. Incidentally, a Detroit district mill claims that it can deliver steel to the Atlantic Coast at less transportation cost than Pittsburgh mills must pay. The steel is taken in boats through the Great Lakes, New York State Barge Canal and the Hudson River. These facts focus attention on the importance which so many companies are attaching to the lowering of freight charges on raw and finished materials. A Midland, Mich., chemical company is bringing West Virginia coal from Sandusky and Toledo, Ohio, to Saginaw, Mich., by boat and thence trucking it to its plant. On the return trip to Saginaw the trucks carry finished chemical products. A Lansing, Mich., automobile parts maker now operates a fleet of trucks between Lansing and Detroit, taking finished parts from Lansing to Detroit, and bringing back to Lansing raw and semi-finished materials. The round trip, including the loading of goods at Detroit, is made in 7 hr. A foundry 50 miles from Detroit receives orders for castings on Monday morning from a Detroit automobile company. On Monday afternoon and Tuesday they are made and on Wednesday morning delivered by truck to the user in Detroit. The saving in such cases involves more than the time element and the actual transportation compared with an all-rail haul. Perhaps the most important consideration is the comparatively small inventories which the user need carry.

Automobile Companies' Earnings Poor in First Quarter

THE first quarter financial showing of the automobile industry does not make inspiring reading. General

Motors did perhaps the best, with 61c. a share earned on its common stock. However, its dividend requirements are 75c. Hudson made 14c. a share, compared with \$1.45 in the first quarter of 1930; Packard less than 1c., against 17c. last year; Studebaker 35c., compared with 62c. a year ago. Hupp Motor Car Corp. lost \$680,911, compared with a net profit of \$66,749 in the initial quarter last year. Willys-Overland earned \$117,106, an improvement of \$1,302,018 contrasted with the same period of 1930. It saved almost \$2,000,000 in overhead expenses, compared with those of a year ago, and its inventories have been reduced 66 per cent. From May 23 to Dec. 31, 1930, the American Austin Co. lost \$1,078,397.

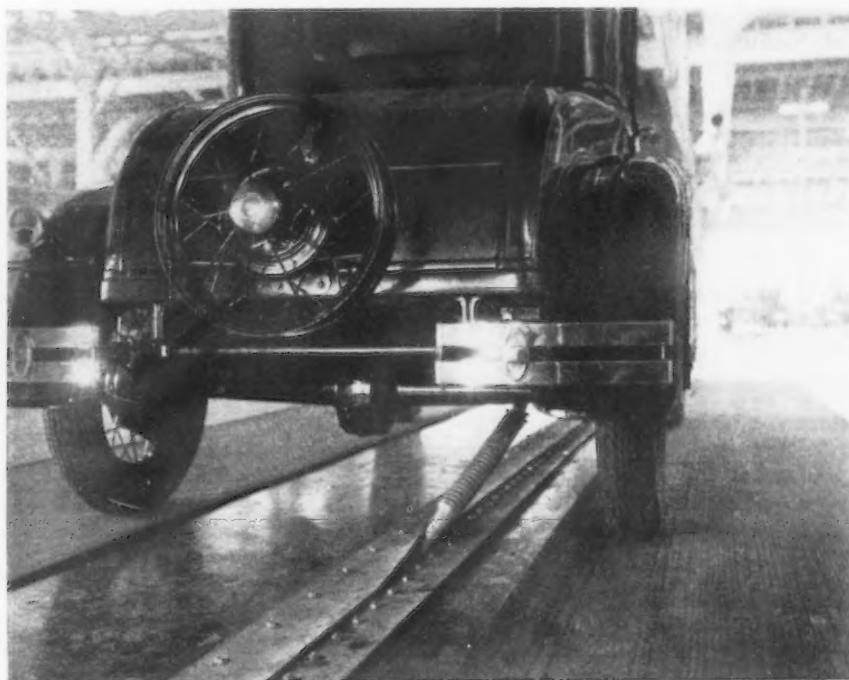
Several new cars and refinements of models now on the market are expected shortly. "Prosperity Six" is said to be the name chosen by a Detroit company for its offering, while the Auburn company is understood to be planning expansion of its Auburn and Cord lines. Norman DeVaux, president of the company making the DeVaux six, reports 12,000 orders from dealers. The Grand Rapids, Mich., plant will assemble 1000 cars this month.

Experiments are being conducted by several automobile companies in chromium plating cylinder bores. There is a strong possibility that this may prove sufficiently successful to be adopted in the next year or two. Chromium in its natural bluish color can be used, since the plating is not exposed to external view. This is an advantage, because the natural hardness of the chrome does not have to be sacrificed in order to gain the shiny white appearance which car owners seem to favor. The plating of cast iron cylinder bores is said to be costly, and the expense involved is likely to be the chief stumbling block to its adoption.

Despite the improvement in operations of the automobile industry, Detroit does not seem to be able to free itself from the enormous burden of supporting thousands of destitute families through its welfare department. In March this dole cost the city almost \$1,900,000 and in February it was approximately the same. The taxpayers must bear this expense, which many citizens contend is not justified. Thousands of people have heard of Detroit's dole and have migrated to this city to be supported by the local government without having to work, it is charged.

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Link-Belt Co., Chicago, in an effort to increase the scope of its editorial cooperation, is planning to prepare a series of data sheets, one to be issued each month. The information and charts, presented in this series of sheets, will cover important phases of material handling and power transmission technical data.



This attachment along the new final assembly line at Rouge plant of Ford Motor Co. carries away the exhaust fumes.

PERSONALS

GEORGE F. RUMMEL, for the past two years assigned to special work and during the previous 26 years assistant general manager of sales of the American Steel & Wire Co., will retire, effective May 1. Forty-five years ago he started as a salesman for



G. F. RUMMEL

Washburn & Moen Co., having the territory west of the Missouri River. In 1894 he was moved to Chicago with Illinois as his sales territory. When in 1901 the Washburn company was taken over by the American Steel & Wire Co., he was made a department manager and was promoted in 1903 to the position of assistant general manager of sales, the position which he held for 26 years. Mr. Rummel plans to rest, making his home for the time being in Chicago.

WILLIAM H. EATON, who has been manager of sales for the American Sheet & Tin Plate Co. in the Chicago district for the past 28 years, will retire May 1. He started in the steel business in 1876 as office boy for Parkhurst & Wilkinson, and, in 1888, was employed by Carnegie, Phipps & Co. as salesman in their Chicago office. In 1896 he became associated with the Aetna-Standard Iron & Steel Co., Bridgeport, Ohio, and, upon the formation of the American Sheet Steel Co., the American Tin Plate Co., the American Steel Hoop Co. and the National Steel Co., the so-called "Moore companies," Mr. Eaton was appointed foreign sales manager for the National company and established headquarters in London. When the United States Steel Corp. was

formed, he returned to this country and soon thereafter was appointed manager of sales at Chicago for the Sheet & Tin Plate company.

SAMUEL M. VAUCLAIN has been elected chairman of the board of the Midvale Co., Philadelphia, succeeding THOMAS NEWHALL, who declined reelection.

FRED L. FLANDERS, formerly chairman of the board, Muskegon Motors Specialties Co., Muskegon, Mich., subsidiary of the Houdaille-Hershey Corp., Detroit, has been elected executive vice-president and general manager of the parent company.

F. L. PIERCE and J. C. WILSON have been elected vice-presidents of Cutler-Hammer, Inc., Milwaukee.

JAMES A. FARRELL, president of the United States Steel Corp., and chairman of the National Foreign Trade Council, will speak on international trade conditions in a radio program of the Westinghouse Electric & Mfg. Co., East Pittsburgh, on Tuesday evening, May 26. The address will be delivered during the Westinghouse salute to international trade, to be given on the eve of the Foreign Trade convention in New York.

F. W. MILLER, formerly vice-president of Rogers Brown & Crocker Brothers, Inc., New York, has been appointed vice-president in charge of the Cincinnati office of Swann Chemical Co. Mr. Miller has been with



F. W. MILLER

the Rogers Brown company for 35 years. He began as a telegraph operator and worked himself up to sales manager and vice-president. He is to be in direct charge of sales of ferrophosphorus for the Swann company.

J. R. MOREHEAD, also previously with



J. R. MOREHEAD

the Rogers Brown company, as assistant to Mr. Miller, has joined the Swann organization and will continue his association with Mr. Miller at the Cincinnati office. The Cincinnati office of Rogers Brown & Crocker Brothers, Inc., is to be closed.

W. H. BENDUHN has been appointed representative of the Young Radiator Co., Racine, Wis., for the Pacific Coast, with offices at 664 Mission Street, San Francisco.

PROF. G. B. WATERHOUSE, of the department of mining and metallurgy of the Massachusetts Institute of Technology, is scheduled to address the meeting of the Springfield, Mass., chapter of the American Society for Steel Treating, May 11, on "Relation of Metallurgical Education to Industry."

J. J. TRAPP has been added to the staff of the Detroit office, in the General Motors Building, of the Billings & Spencer Co., Hartford, Conn.

G. H. GARCELON has been appointed manager of the control engineering department of the Westinghouse Electric & Mfg. Co., East Pittsburgh, succeeding J. H. BALKNAP, who has been transferred to the engineering

division of the company's Pittsburgh district office. Mr. Garcelon, a graduate of the Massachusetts Institute of Technology, was recently manager of engineering at the company's East Springfield, Mass., works and is well known for his work in the designing of small motors.

ROBERT M. KILGORE, New York district sales manager of the Jones & Laughlin Steel Corp., has sailed for Europe to be gone several weeks.

A. M. STEEVER, metallurgical engineer, Great Lakes Forge Co., Chicago, was the speaker at a recent meeting of the Rockford, Ill., chapter of the American Society for Steel Treating. His topic was the drop forging industry.

A. W. CARLISLE, treasurer of the Illinois Steel Co., Chicago, will retire from active service on May 1, after having served the company for 41 years.

GARRETT A. CONNORS, JR., director of purchases for the Truscon Steel Co., has been appointed a vice-president. He has been with the company almost since its organization and served for many years as safety director.

WILLIAM THOMPSON, assistant to the president of the American Steel & Wire Co., will retire May 1 under the terms of the new pension plan recently adopted by the United States Steel Corp. Mr. Thompson has been an employee of the Steel Corporation and the companies merged with it for over 48 years. Born in England in 1857, he came to the United States in 1882 and entered the service of the Joliet Steel Co., in its Chicago office. He remained with this company and its successor, the Illinois Steel Co., until Jan. 1, 1898, when he was transferred to the American Steel & Wire Co. He went to Cleveland in 1904 as secretary to the president and has been assistant to the president since 1919. He was tendered a farewell luncheon April 23 by his business associates at the Union Club, Cleveland. Mr. Thompson will leave shortly for an extended trip to England and on his return will make his home in Chicago.

CLARENCE H. HOWARD, founder and former president of the Commonwealth Steel Co., Granite City, Ill., which was taken over by the General Steel Castings Corp. two years ago, has resigned as chairman of the board of the latter company. CLARENCE H. HOWARD, JR., manager of the foreign department of the General Steel

Castings Corp., and E. HOWARD HOOPER, assistant and nephew of the elder Howard, also have resigned. The senior Howard will remain a member of the board of directors.

G. T. SNYDER, chief engineer, National Tube Co., Lorain, Ohio, has been transferred to the company's engineering department at Pittsburgh.

WILLIAM W. NICHOLS, vice-president, D. P. Brown & Co., Detroit, and chairman of the A. S. M. E. research committee on the cutting of metals, has been named Officer of the White Lion Czechoslovakian Order, this honor having been conferred in recognition of eminent services rendered to Czechoslovakian citizens in the United States. The investiture was made April 13 by DR. B. KUSKA, Czechoslovakian consul for the Detroit district. Joseph Elias, master of ceremonies on the occasion, characterized Mr. Nichols as instructor and personal advisor to scores of young men sent to Detroit by Czechoslovakia to learn American engineering and construction methods.

WALTER R. COLLINS and DAVID G. JONES, veteran employees of the Carnegie Steel Co., at Youngstown, who retire May 1 on pension, were honored this week by the Carnegie Steel Co. Employees Relief Association. Mr. Collins has served the company 32 years, 16 years of which as superintendent of the finishing department. He has been president of the relief association two years and vice-president for 24 years. Mr. Jones has been with the company 42 years, working as a pipe threader. For 32 years he was a director of the relief association. F. B. QUIGLEY, assistant general manager of the Youngstown district, was among the speakers.

GEORGE M. LAUGHLIN, 3RD., son of the chairman of the board of the Jones & Laughlin Steel Corp., Pittsburgh, has been elected a director of that company.

FREDERICK A. OEFINGER, of Emaus, Pa., has been elected president of the Plantsville Foundry Corp., Southington, Conn., maker of gray iron castings, to succeed THOMAS W. THOMSON. The plant has been closed for about a year and will resume operations within a week.

E. A. MULLER, president, King Machine Tool Co., Cincinnati, was the principal speaker at the meeting of the Cincinnati chapter, National Association of Cost Accountants, April 23. E. F. DUBRUL, general manager of the National Machine Tool Build-

ers' Association, was chairman of the meeting.

R. E. AFFANTRANGER, of the Vlchek Tool Co., has been elected president of the Purchasing Agents' Association of Cleveland; J. M. MCKENZIE, West Steel Castings Co., vice-president; G. A. COLLIER, Cleveland Automatic Machine Co., secretary, and R. C. DONLEY, Donley Brothers Co., treasurer. New trustees include R. G. SWEENEY, Allyne-Ryan Foundry Co.; H. H. KRAUSE, National Screw & Mfg. Co.; R. M. GRISWOLD, Gears & Forgings, Inc., and K. C. FERGUSON, H. K. Ferguson Co.

F. W. MEYER, vice-president of the Mississippi Valley Research Laboratories, St. Louis, spoke recently before the St. Louis District Foundrymen's Club on "The Application of Microphotographs to Foundry Practice and the Relation of the Microstructure to the Quality of Gray Iron." The meeting was held at the David Rankin, Jr., School of Mechanical Trade, and after the address the school foundry was inspected.

OBITUARY

J. HUGH MCINNIS, assistant general superintendent of the Inter-State Iron Co., Virginia, Minn., died April 15 of pneumonia. He was born at Ishpeming, Mich., in 1883. From early manhood he had been connected with the iron ore mining industry, first as an employee of the Oliver Iron Mining Co. in the Fayal laboratories at Eveleth. In 1905 he entered the employ of the Inter-State Iron Co. as chief chemist and in 1917 he was promoted to the position of assistant general superintendent, the position he occupied until his death.

W. L. BRYANT, of the Bryant Chucking Grinder Co., Springfield, Vt., died suddenly on April 25, aged 55 years. He was formerly chief engineer of the Jones & Lamson Machine Co. and organized the Bryant company in about 1910.

GRANT H. CRENNELL, superintendent of the Columbia Steel & Shafting Co., Carnegie, Pa., died at his home in Crafton, Pa., on April 24, aged 44 years. He was born in Cleveland, and had been identified with the Pittsburgh steel industry for about 15 years.

ALVIN W. KRAHN, president, Krahn Mfg. Co., metal specialties, Milwaukee, died April 15 after a brief illness. He was a lifelong resident of Wisconsin and was 58 years of age. He established his company in 1906 after being connected with the Nordberg Mfg. Co. for more than 15 years.

Bank Debts and Production as Indicators

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

PPRICE times physical volume gives us an excellent index of the business cycle. It allows both for industrial activity and for prices, and its changes approximate changes in total value of industrial output. As plotted here, this index brings out clearly the great sharpness of the business recession. The index is based on the average for 1921-1926—which we have clung to throughout the “new era”—and this base now seems to be none too low. Some encouragement, perhaps, is to be gained from the fact that the decline in the estimated value of production is tapering.

Bank debts also are a measure which, like price times volume, allows for values. It is different, however, in that it is much influenced by speculation. Bank debts parted company with the production-value curve in 1927, with the beginning of the new era, and at the maximum divergence in the fall of 1929 represented a huge volume of liquidating transactions in the stock market.

Bank debts are not yet in line with the value of production, although the figures have declined more than 50 per cent from the peak. This is perhaps due partly to the existence of high prices for a good many stocks and for labor, but probably chiefly indicates that buying and selling have been maintained better than has production. To the extent that this buying and selling includes a normal proportion of essential commodities at normal prices, its relatively high level is favorable.

One interesting aspect of the production-value line is the basis it furnishes for testing the reasonableness of the volume of credit outstanding. The level of bank debts also has its significance in this connection. The volume of “primary” bank credit, as measured by total loans and investments of member banks, appears to be in excess of indicated requirements. The credit curve is much above its

average relationship to either production values or bank debts.

We could feel much more hopeful as to an early business recovery if there had been more progress in liquidating credit, to bring it more nearly in line with the business situation, including both activity and prices. It may well be suspected that the situation shown in the chart is an indication of the large amount of credit inflation which still exists.

The long-time trend of the credit curve appears to have been a rising one. As a result, it parted company with production values in July, 1929, when an extraordinarily sharp slump came in the latter which has brought the index down more than 50 per cent. But since June, 1929, the loans and investments of the member banks have, on the whole, **increased, and loans have declined only 6 per cent.**

Thus the credit measurements are much out of line, and this is true both of security loans and of investments. This lies back of stock market liquidation and bond market weakness. It is true also that loans and investments are out of line with the total bank deposits, the ratio still being high.

Great expansion in bank investments during recent months is an outstanding phenomenon of the period. In part, it represents the usual shifting of earning assets from loans, which occurs in periods of depression and low money rates.

Speaking broadly, our chart shows production value to be around the levels of early 1921. Bank debts have fallen close to the levels found in the second half of 1924. Both measurements are more than 50 per cent below their peaks. While bank loans have shown considerable liquidation, they are down only to the levels of early 1928, and bank investments are at peak levels, so that total loans and investments appear to be much out of line with the requirements of business and industry.



March figures show gains in all three items, the bank debts registering a sharp upturn. But that item still remains on the early 1925 level; industrial production compares with late 1921; loans, discounts and investments alone hold the high position of 1929 averages.

Not Yet a Five-Day Week

NOT so imminent as seems to be believed in some quarters is the five-day week. Shortened sessions recently effected are largely today's answer to the unemployment problem. There is little reason to expect they will necessarily remain when demand expands. Not so much will then be said, for example, of technological unemployment—this era's term for the displacement of the man by the machine. It may be that some day the world's work will be done in five days or four days a week, but it is not yet.

The whole notion of the emancipation of man from work was on the way to be taken rather literally. It was a part of the "new era" thinking. One must be sure, it was inferred, to secure his quota of leisure, and it was a quota of expanding proportions. The fact that over-stressing leisure might rob a business of the consideration to which it was entitled and that reduced output per unit of overhead might result in mounting manufacturing costs was a secondary matter at a time when things were bought rather than sold. Intense application to work as practiced by previous generations came to be regarded as rightly overdone, but there is sanity in the now increasing vogue of working and saving.

To concentrate the satisfying of current diminished demand into fewer days should make for more efficient operation. If the volume to be produced may easily be compassed in five days, there is no relief of employment in running six. So far as the white collar workers are concerned, salaries are being cut more or less in proportion to the curtailment of work days. They represent a manufacturing saving rather than a shorter-length work period.

Yet, despite these adjustments to minimize losses, it still is a fact that the economic status of the individual is everybody's concern. That is why, of course, cutting of wages was kept as long as possible out of the reckoning, when business began to slump. That attitude was a natural sequel to accepting the dictum that the buying power of wages was a measure of prosperity. Now, all other expedients failing, wages are in for a trimming. This does not mean there is a revoking of a belief in reasonably high wages, but rather a paring of wages along with other items with the hope that sooner or later the individual's position will be substantially unimpaired.

The yoking of "high wages" with "scale of living," so much discussed in these recent years, reminds one how the late Henry L. Gantt, of scientific management fame, used to rail at the over-emphasis on selling, until, said he, with classes for salesmen and lectures on selling on every corner the public was in line to be loaded up with things for which it

had little or no use. Excessive pressure of selling is undoubtedly responsible for much of the amazing expansion in consumption in 1928 and 1929, which was supposed to show the high scale of living reached in the United States. No wonder Europe marveled at the heights so rapidly reached and questioned if they could be held.

The reductions in the number of hours of employment can hardly be regarded as yet as presaging a new era in industry; they are too much tinged with the stern necessities of the industrial finances.

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Smaller Seasonal Swings

IN a period when depressing influences are likely to affect judgment, the tendency is for purchases to be deferred beyond their usual time in the year. Where there has been a spring peak it might come later than usual and the summer trough would be less marked than usual. The seasonal swings we have witnessed in the past have been due partly to buying habits, whereas in a period like this purchases are going to be made only as actual ultimate requirements force them.

There has been so much unfavorable sentiment that it is well to emphasize the fact that the Federal Reserve Board's index of industrial production, adjusted for usual seasonal variation, rose from 82 for January to 86 for February. If particular conservatism has prevailed as to buying, one may assume that the February number as given is if anything too low. It marks the first favorable turn since the early months of last year, when apparently there was a false start.

The board's industrial index is a composite or weighted average, and each activity considered is of course given its own individual seasonal adjustment before the figure is carried into the total that makes the adjusted average. By studying the records one may deduce what is the equivalent of a composite adjustment, although the board does not use any such factor. Comparing unadjusted and adjusted totals in the past, it is found that the expectancy is for industry as a whole to reach a peak in February or March (with February a little in favor), then to dip, leaving April and May above the average; the next three months, and particularly July, are below the average, with the next three months above the average, the highest being in October.

In a series of index numbers averaging around 100 or a little over, February and March would be about three points high, July about four points low, and October again about three points high. The average swing of the past as thus indicated is by no means a great one, and we should expect less downward swing this year, for certainly there was no repetition of the

mistake of early last year of thinking the worst was over.

The recent index by no means suggests anything approaching stagnation, however unfavorable may have been the common appraisals or notions as to the state of trade. It is easy to make a long-range comparison, to bring out the point that part of the recession is general in character and part is reaction from an unusual bulge. After recovery from the 1921 depression industry struck a certain gait which involved a gradual and presumably healthy annual increase, about two points a year in the board's index, whereby June, 1928, with 1923-4-5 as base, stood at 109. The following June showed 126, or 17 points increase instead of two points. The total fall was to 82 for last January. That was just 35 per cent in 19 months, and rather spectacular. But if one theorizes that part of the drop was due to the previous bulge, he may take the 109 of June, 1928, and reflect that the low 82 of last January is in part an equalization of the bulge that came after the middle of 1928.

Thus the showing is not so poor and the four-point increase from January to February supplies quite a ray of hope that the heaviest payments on the bill of equalization have been made.

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New Sheet Price Structure

SINCE 1923 the process of rolling sheet steel by the continuous method has developed so rapidly that today, in volume of output, quality of product and cost of manufacture, it has made cumbersome the price structure on which sheet steel has been sold. In fact, the inadequacy of the old structure as applied to the new process has been a primary cause of demoralization, while the industry has been groping for new standards.

It is not surprising that the American Rolling Mill Co., which introduced the revolutionary continuous method of producing sheets, should take the initiative in evolving a new basis for marketing these products. Its program, announced on April 21 and effective May 1, basically separates the selling structure for hot-rolled sheets from that for cold-rolled sheets on the same distinction prevailing between hot-rolled and cold-rolled strip steel. That is, there will be no differential for cold-rolled sheets over hot-rolled sheets, as each is to be sold on its own basis. On the other hand, as there are extras in cold-rolled strip steel for special features of flatness, thickness tolerances, nickel plating or other bright finishes, likewise is there held to be justification for extras to cover grade and inspection hazards in pickled cold-rolled sheets.

A further basic change lies in the complete separation of all price structures for No. 16 gage and heavier from No. 17 gage and lighter, owing to a corresponding separation of these gages when made on the new-type manufacturing units. The fact that in large proportion cold-rolled sheets are produced by cold reduction from heavy gage hot-rolled sheets establishes a competitive standard that justifies the elimination of a treatment extra for a cold-rolled sheet over the same gage in black sheet.

The tremendous reductions in base prices and in differentials for widths, drawing quality and finish, plus a constant improvement in quality, have all been an evolutionary part of a revolutionary program which has been highly beneficial to sheet buyers but has brought chaos to sheet producers in the matter of prices. This is well illustrated in automobile body sheets, where the elimination or reduction of extras for finishes, drawing qualities and sizes has meant a lowered return to sheet mills of about \$15 a ton in two years' time. Add to this a decrease in base prices of about \$20 a ton and it is seen that the producers' revenue from this material today is about \$35 a ton less than in the second quarter of 1929.

A comparable situation exists in other grades of sheets. Conditions have been aggravated by the overlapping of prices of various grades resulting from the attempt to apply a now archaic nomenclature to new products. At times this has served as a convenient subterfuge for price cutting.

The program setting up a new price structure is the first step toward stabilization which the sheet steel industry so badly needs. Prices have retreated so far that in many cases they are now below production costs. The new basis for selling sheets takes into account present manufacturing practices, eliminates many evils which have crept in during recent years, and gives the industry a fresh start.

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The Meaning of Wage Cuts

EVERY day of the depression brings out new diagnoses of our economic troubles and new prophecies of the future course of events. But with the multiplication of interpretations of the business situation, sentiment is becoming more confused and bewildered. Our economic difficulties are apparently as complex as life itself and it is unlikely that their meaning can be comprehended, currently at any rate, by any one man or group of men.

It is indeed risky at a time like this to attempt to relate theory to fact. We hear much at the moment about the necessity for wage reductions "to complete the readjustment." But wage cuts, where they are being made, are not being prompted by a belief that they will bring about economic recovery. Certainly wage revisions to date—and there have been plenty of them—have failed to accelerate the tempo of business. Wage rates are being reduced, reluctantly we believe, because of necessity. For, with most manufacturing companies, the wage earnings of workers have already been sharply reduced because of part-time employment. Management's problem is not "to complete the readjustment" but to keep as many employees at work as possible.

In other words, industry's job now, and probably for some time to come, is to insure its workers at least a subsistence. The remarkable record of the Steel Corporation in dividing available work among its employees became apparent with new force last week when Myron C. Taylor, chairman of the finance committee, stated that so far as he was aware not a single employee was in want.

Amendment of Anti-Trust Laws Asked by Mill Supply Groups

Triple Convention in Washington Discusses Problems of Distribution in Steel and Machinery

WITH an attendance of approximately 550, the triple convention of the American Supply and Machinery Manufacturers' Association, National Supply and Machinery Distributors' Association and the Southern Supply and Machinery Dealers' Association began a three-day session at the Wardman Park Hotel, Washington, on Monday.

At a meeting of the list price committee of the National association, headed by Wendell Clark, of Samuel Harris & Co., Chicago, it was urged that manufacturers of mill supplies adopt higher list prices in catalogs in order to care for price fluctuations by discounts. Similar action was recommended at meetings of the other associations. The point was made that often prices change even when catalogs are in course of preparation and that distributors ought to be allowed leeway to adjust prices to changing conditions through discounts instead of having to adhere to the prices quoted. The association adopted a resolution condemning the practice of "single insertion" programs in connection with complimentary advertising.

Urge Amendment of Anti-Trust Laws

Amendment of the anti-trust laws so that industry would be able to cooperate without danger of prosecution in meeting economic conditions and competition was advocated in an address at a joint meeting yesterday morning by James W. Gerard, former ambassador to Germany, in the annual report of George A. Fernley, secretary-treasurer of the National association, and also in an address on "The Sherman and Clayton Acts" by J. Harvey Williams, of J. H. Williams & Co., Buffalo, the latter speaking before the American association.

The committee on the code of correct business practices of the National association submitted its report, together with the proposed code, with a view to having it adopted before the convention adjourns. The official board of the association at the convention in Memphis, Tenn., last year expressed the view that a code of ethics would be helpful and at its semi-annual meeting Dec. 5 approved recommendations of the committee.

Manufacturer-Distributor Cooperation Essential

In his report to the national association, Mr. Fernley pointed out that effective and intelligent cooperation of

manufacturers with distributors for placing the distribution of mill supplies on a more satisfactory and profitable basis and rectifying practices of an uneconomic and unwholesome character is recognized as one of the fundamental problems of members of the association. He declared that progress has been made in directing attention to evils resulting from direct competition and its co-related problems. The association, it was stated, has emphasized the fact that distributor service is essential to manufacturers and buyers; that distributors serve both in an efficient and economical manner and that direct competition as well as various other attempted short cuts are not only unsound but in a very large measure directly responsible for a number of conditions which magnify the problems of distribution, including profitless price competition. It was declared that manufacturers are giving more careful attention to the problems of distributors and assuming a more helpful attitude.

Growing sentiment in favor of modification of the anti-trust laws, Mr. Fernley reported, to permit reasonable and more intelligent cooperation for the stabilization and improvement of conditions was stimulated by President Hoover's recommendation to Congress last December of an inquiry into their adequacy.

Scattering Purchases Complicates Problem

The practice on the part of many buyers of scattering their purchases among a large number of distributors, it was stated, tends to complicate problems of the industry, and the fact was said to have been conclusively brought out in distribution studies recently published by the Department of Commerce.

As a result of current studies of the possibility of lowering distribution costs, Mr. Fernley pointed out, emphasis is being placed on the advisability of adjusting package quantities in many lines. The necessity for breaking packages, it was contended, inflates handling costs, increases breakage and hastens depreciation owing to the fact that loose packages quickly become shopworn. It was suggested therefore that manufacturers study this question more carefully with the view to packing their products in a manner which will facilitate their handling.

Reference was made to a booklet entitled "Cooperation Versus Compe-

tition" which the association printed and distributed to emphasize harmful results of unintelligent competition. The booklet was said to have been received with unusual interest. Mr. Fernley declared that the desire for volume during periods of business adjustment causes competitors to give undue credence and attention to unfounded rumors, or accept without verification stories brought to them by salesmen. These reports were said at times to cause needless price competition of a demoralizing character and to promote other practices of an unwholesome nature.

Simplification Program Needs More Emphasis

Mr. Fernley reported on work of simplification done by the association, but said that correspondence of the Division of Simplified Practice, Bureau of Standards, with manufacturers indicates that some of them do not favorably regard simplification at the present time. It was stated that it will be helpful if individual members supplement the work of the association by emphasizing to manufacturers the need for eliminating unnecessary duplication of styles, sizes and varieties of their products.

As a result of efforts of the association, it was stated, manufacturers have indicated their willingness to continue to allow a 2 per cent cash discount or premium for anticipating the due date of a bill because it is a sound business practice.

Further progress in cooperating with purchasing agents was reported. Exchange of ideas between the Purchasing Agents' Association and the National Supply and Machinery Distributors' Association through speakers before groups has been arranged.

Resistance Welding in Jobbing Work

(Concluded from page 1443)

come more or less well known. Likewise have the innumerable applications in all branches of the metal-working industry, indicating the heightening status of this welding process in present-day manufacture. What is not so well known, however, is the versatility of the electric resistance welder. The applications cited above serve, it is hoped, to show that this type of welder is not a one-job production unit, but that the same machine may be used on many different sizes and kinds of work, and may even be used, full or part time, for work other than welding. And, it should be stated, there is still plenty of room for originality in such welding applications.

Harnischfeger Sales Corp., Milwaukee, has moved its New York office to the Empire State Building.

MARKETS



Steel Production Shows Both Increases and Decreases

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TOTAL Ingot Output Gives Way Only Slightly to 48 Per Cent — New Structural Projects Aggregate 103,000 Tons — Scrap Still Declining.
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DEVELOPMENTS in the iron and steel market are less uniformly negative than in recent weeks and the sagging tendency of demand is less pronounced, although not yet halted.

Steel ingot output has shown slight improvement at Buffalo, Birmingham and Chicago, but this gain has been more than offset by losses in the Pittsburgh and Valley districts, with the result that the average for the country at large has fallen from 49 per cent to a fraction above 48 per cent of capacity.

PRICES still have a weak tone, although actual declines are limited mainly to scrap. Heavy melting steel is off 25c. a ton at Chicago and there have been scattered reductions in other grades in most market centers. THE IRON AGE composite price for heavy melting scrap has declined from \$10.75 to \$10.67 a gross ton, the third recession in three weeks.

LARGE prospective orders for fabricated structural steel again loom up as possible sustaining influences, and active negotiations for large tonnages of line pipe are encouraging, but the placing of actual contracts is exasperatingly slow. Demand for reinforcing bars for both building and road construction is in good volume and there is a steady flow of steel to makers of accessory equipment, such as road graders and steam shovels.

Further declines in specifications for automotive steel are reported, but short-range prospects for motor car production have improved. An April output of 330,000 cars in the United States and Canada now seems assured, and predictions of approximately the same total for May are more confident.

TIN mill operations remain relatively high, at 75 to 80 per cent of capacity, although they have failed to regain the slight losses of last week and may have passed the peak for the year. Thus far in 1931 shipments of tin plate have been only about 5 per cent below those of 1930.

Rail orders include 16,000 tons placed by the Great Northern with the Bethlehem Steel Corp., supplementing 9000 tons purchased from the Colorado mill a week ago, 4000 tons placed by the Seaboard Air Line with the Ensley mill and 3000 tons bought by the Minneapolis & St. Louis at Chicago. Despite these additions to mill backlogs, production of both rails and track accessories is slowly receding.

NEW fabricated structural steel projects total 103,000 tons, including 75,000 tons for a bridge at San Francisco on which bids will be opened June 17. Inquiries reported since the first of the year aggregate 1,118,000 tons, compared with 525,000 tons for the corresponding period in 1930 and 636,000 tons in 1929. Awards, at 13,000 tons, are the smallest for any week since the end of January.

THE only new break in finished steel prices is in cold-rolled strip, which has been sold at 2.15c. a lb., Pittsburgh, or \$2 a ton below the recent market. Galvanized sheets are more generally available at 2.80c., Pittsburgh, and the market on plates, shapes and bars is now commonly regarded as 1.65c., Pittsburgh, although there continue to be extensions of protections at 1.60c. Sales at 1.70c. are limited to small, miscellaneous lots.

The change in nomenclature of various finishes of sheets announced by the American Rolling Mill Co. last week is being studied by the industry and has already been adopted by several other manufacturers. Base prices on some of the finishes of sheets under the new classification have been made public. Pending an analysis of the effect of the change many sheet buyers are deferring action on orders.

PIG iron demand is exceedingly light, with shipments showing a declining tendency and collections growing more difficult. The best showing in shipments is by Cleveland furnaces, whose April total will run slightly ahead of that for March. Chicago shipments barely exceed those of March, while Detroit deliveries, although now receding, are expected to show no loss for the entire month.

The Steel Corporation's earnings for the first quarter were disappointingly small. In the face of improved operations, gross income dropped to \$19,500,000 from \$23,000,000 for the fourth quarter of 1930. Income available for common stock was a shade over 5c. a share against 27c. for the preceding three months.

THE IRON AGE composite prices for finished steel and pig iron are unchanged at 2.128c. a lb. and \$15.79 a ton respectively.

PITTSBURGH

Steel Orders Still Reflecting a Downward Tendency—Operations Lower

PITTSBURGH, April 28.—With orders for finished steel products still reflecting a downward tendency, and little interest reported on the part of consumers, conditions in this district appear to be less favorable than they were a week ago. Raw steel output is again lower, now being estimated at not more than 45 per cent of capacity, while production of finishing mills has shown no gain.

Tin plate operations have failed to recoup the slight losses reported last week, and production of sheets and strip steel is still declining. Bar mills are able to maintain production largely on the strength of releases for reinforcing bars, but structural steel production has not increased materially, and output of rails and track accessories continues to be checked. Pipe production has not yet reflected increased activity in line pipe, although pending orders are expected to correct this situation in short time.

Steel production in the Wheeling district is maintained at 55 per cent of capacity, but output in the Valleys has dropped to 40 per cent, with the prospect of a decline in blast furnace activity before the end of the week.

The market is entirely devoid of outstanding orders from individual industries for the first time in many weeks. Pipe line activity still seems to offer the best outlook for business of this sort in the near future. A number of projects are still actively pending, and the amount of prospective business has been increased by extensive plans for gas line developments in the Middle West. The structural market is quiet locally, and shipments of both reinforcing steel and structural shapes have failed to increase in a manner which had been hoped for by this time of the year. The prospect for barge buying is still good, but inquiries are still in the tentative stage.

The manufacturing consumers of steel products continue quiet. Steel companies serving the automobile industry still report a lack of interest on the part of Michigan steel consumers in their May requirements, although it now seems assured that one of the large makers of low-priced cars will continue its April production schedules into the new month. Several of the companies making cars in the medium-priced class have curtailed their steel orders sharply. Shipments to the farm implement makers are still showing slight improvement. Galvanized roofing is more active, and culvert makers are still busy. Demand for steel from the railroads is restricted, and lighter releases will certainly be reflected in May operations.

Prices show no marked change, ex-

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Trend of steel orders is still downward, with consumers showing little interest.

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Operations are off slightly to about 45 per cent at Pittsburgh and 40 per cent in the Valleys. Wheeling district unchanged at 55 per cent.

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Steel market devoid of outstanding inquiries, but pipe line prospects are fairly promising.

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Steel orders from automobile industry for May production indicate possibility of some declines in schedules.

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Scrap market still weak, with price declines mostly in minor grades.

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cept in the case of galvanized sheets and cold-rolled strip, both of which are weaker. Otherwise, sheet prices are nominally holding, pending the announcement of base prices on the new schedules of differentials announced last week by a leading producer.

PIC IRON

New business has been particularly light in the last week, although shipments against contracts are holding up fairly well. No formal inquiry is before the trade, and current orders are generally for small lots. Prices are unchanged.

Prices per gross ton, f.o.b. Valley furnace:	
Basic	\$16.50 to \$17.00
Bessemer	17.00
Gray forge	16.50
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.00
Low phos., copper free....	26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton f.o.b. Pittsburgh district furnace:	
Basic	\$17.00 to \$17.50
No. 2 foundry	17.50
No. 3 foundry	17.00
Malleable	17.50
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

SEMI-FINISHED STEEL

The market has not been tested by recent buying, and shipments in the last week have shown no material change. Billets, slabs and sheet bars are nominally quoted at \$30, Pitts-

burgh, and forging billets at \$30. Wire rods are quiet, with prices ranging from \$35 to \$37, Pittsburgh.

RAILS AND TRACK ACCESSORIES

Shipments of railroad materials this month will equal March aggregates, but the recent trend in specifications indicates some curtailment during May. The local rail mill next month will begin to roll 152-lb. rails for the Pennsylvania Railroad, assuring a fair operation during the month. Makers of accessories have already begun producing for this business. Prices of accessories are unchanged at recent levels.

BARS, PLATES AND SHAPES

The past week has brought little change in the market on heavy hot-rolled steel products, and producers of reinforcing bars and structural steel are somewhat disappointed at the failure of specifications to show material improvement. The bridge over the Youghiogheny River at Boston, Pa., requiring 2000 tons of shapes, has been let to a local fabricator, but no other important awards are reported. Barge contracting has also been light, although prospective business is still encouraging. Demand for bars from the automobile industry is still tapering off, and early prospects for May requirements are not very good. The same holds true in the case of alloy steel bars, although in this product strict adherence to price is a favorable factor.

Prices on bars, plates and shapes show little change, and, with scarcely any new business coming into the market, the possibilities of shading are minimized. Occasional small lots of bars and plates are being sold at 1.70c., Pittsburgh, but shipments against old contracts are largely at lower prices.

COLD-FINISHED STEEL BARS

Specifications are very light, and little new business is coming into the market. Shipments are falling considerably under March levels, and early releases for May delivery indicate further curtailment next month. The price is well maintained at 2.10c., Pittsburgh.

BOLTS, NUTS AND RIVETS

Reports of revised prices on bolts and nuts are emphatically denied by producers in this territory, and it would seem that present discounts of 73 per cent off list for bolts and nuts, and 70, 10 and 5 for small rivets will be continued by leading producers. Large rivets are also holding at \$2.75, Pittsburgh or Cleveland. Or-

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Apr. 28, 1931	Apr. 21, 1931	Mar. 31, 1931	Apr. 29, 1930
No. 2 fdy., Philadelphia.....	\$17.76	\$17.76	\$17.76	\$20.26
No. 2, Valley furnace.....	17.00	17.00	16.50	18.50
No. 2 Southern, Cin'ti.....	14.19	14.19	14.19	16.69
No. 2, Birmingham.....	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago*.....	17.50	17.50	17.50	19.00
Basic, del'd eastern Pa.....	17.00	17.00	17.25	18.75
Basic, Valley furnace.....	16.50	16.50	16.50	18.50
Valley Bessemer, del'd P'gh.....	18.76	18.76	18.76	20.76
Malleable, Chicago*.....	17.50	17.50	17.50	19.00
Malleable, Valley.....	17.00	17.00	17.00	19.00
L. S. charcoal, Chicago.....	25.04	25.04	25.04	27.04
Ferromanganese, seaboard.....	80.00	80.00	80.00	94.00

Rails, Billets, Etc., Per Gross Ton:	Apr. 28, 1931	Apr. 21, 1931	Mar. 31, 1931	Apr. 29, 1930
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Re-rolling billets, Pittsburgh.....	30.00	30.00	30.00	33.00
Sheet bars, Pittsburgh.....	30.00	30.00	30.00	33.00
Slabs, Pittsburgh.....	30.00	30.00	30.00	33.00
Forging billets, Pittsburgh.....	36.00	36.00	36.00	38.00
Wire rods, Pittsburgh.....	35.00	35.00	35.00	38.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.....	1.65	1.65	1.65	1.85

Finished Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.65	1.65	1.65	1.75
Bars, Chicago.....	1.75	1.75	1.75	1.90
Bars, Cleveland.....	1.70	1.70	1.70	1.80
Bars, New York.....	1.98	1.98	1.98	2.09
Tank plates, Pittsburgh.....	1.65	1.65	1.65	1.80
Tank plates, Chicago.....	1.75	1.75	1.70	1.90
Tank plates, New York.....	1.93	1.93	1.93	2.02½
Structural shapes, Pittsburgh.....	1.65	1.65	1.65	1.80
Structural shapes, Chicago.....	1.75	1.75	1.70	1.90
Structural shapes, New York.....	1.90½	1.90½	1.90½	1.99½
Cold-finished bars, Pittsburgh.....	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh.....	1.55	1.55	1.55	1.70
Cold-rolled strips, Pittsburgh.....	2.15	2.25	2.25	2.55

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh.....	2.25	2.25	2.25	2.55
Sheets, black, No. 24, Chicago.....	2.35	2.35	2.35	2.65
dist. mill.....	2.80	2.85	2.90	3.30
Sheets, galv., No. 24, P'gh.....	2.90	2.95	3.00	3.40
dist. mill.....	2.00	2.00	2.05	2.15
Sheets, blue, No. 13, P'gh.....	2.10	2.15	2.15	2.25
dist. mill.....	1.90	1.90	1.90	2.15
Wire nails, Pittsburgh.....	1.95	1.95	1.95	2.20
Wire nails, Chicago dist. mill.....	2.20	2.20	2.20	2.30
Plain wire, Pittsburgh.....	2.25	2.25	2.25	2.35
Barbed wire, galv., P'gh.....	2.55	2.55	2.55	2.95
Barbed wire, galv., Chicago.....	2.60	2.60	2.60	3.00
dist. mill.....	5.00	5.00	5.00	5.25
Tin plate, 100 lb. box, P'gh.....				

Old Material, Per Gross Ton:	Apr. 28, 1931	Apr. 21, 1931	Mar. 31, 1931	Apr. 29, 1930
Heavy melting steel, P'gh.....	\$12.25	\$12.25	\$12.75	\$15.75
Heavy melting steel, Phila.....	10.25	10.25	10.50	13.50
Heavy melting steel, Ch'go.....	9.50	9.75	10.00	13.00
Carwheels, Chicago.....	9.50	9.50	9.50	14.25
Carwheels, Philadelphia.....	12.50	12.50	13.00	15.00
No. 1 cast, Pittsburgh.....	12.25	12.25	12.50	14.25
No. 1 cast, Philadelphia.....	11.50	11.50	11.50	15.00
No. 1 cast, Ch'go (net ton).....	9.00	9.50	9.50	13.25
No. 1 RR. wrot., Phila.....	11.00	11.00	12.00	15.00
No. 1 RR. wrot., Ch'go (net).....	8.00	8.25	8.25	11.25

Coke, Connellsville, Per Net Ton at Oven:	Apr. 28, 1931	Apr. 21, 1931	Mar. 31, 1931	Apr. 29, 1930
Furnace coke, prompt.....	\$2.50	\$2.50	\$2.50	\$2.60
Foundry coke, prompt.....	3.50	3.50	3.50	3.50

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	9.87½	9.87½	10.12½	14.12½
Electrolytic copper, refinery.....	9.25	9.50	9.50	13.75
Tin (Straits), New York.....	23.75	24.62½	26.75	34.37½
Zinc, East St. Louis.....	3.40	3.62½	3.95	4.72½
Zinc, New York.....	3.75	3.97½	4.00	5.07½
Lead, St. Louis.....	3.90	4.25	4.25	5.40
Lead, New York.....	4.10	4.50	4.50	5.50
Antimony (Asiatic), N. Y.....	6.85	6.85	7.00	7.60

ders are light, and the industry is operating at not more than 35 per cent of theoretical capacity. Releases from the railroads have been particularly discouraging in recent weeks.

TUBULAR GOODS

Following the placing of 160 miles of 12-in. seamless pipe with a Pittsburgh mill last week, little new tonnage has been reported. On the other hand, reports of extended developments of gas lines in the Middle West are being watched with interest by pipe producers, as some of the programs, if carried out, would lead to large tonnages of line pipe. Several buyers of pipe are actively negotiating for line requirements for use in transporting both gas and gasoline, but orders are still slow in reaching mills. In the meantime, pipe mill operations are lighter, although a fair amount of small orders is aiding operations in some departments. Butt-weld pipe is a little bit more active,

but the improvement is less than seasonal.

WIRE PRODUCTS

Following some weeks of improved shipments of merchant wire products, demand has again subsided somewhat. Jobbers have built up their stocks for spring trade in most cases, but in few cases are inventories high. Under the circumstances any improvement in consumers' demand would likewise be reflected rather quickly in mill releases. Manufacturers' wire is quiet, reflecting the declining tendency in automotive requirements. Prices range from 2.20c. to 2.30c., Pittsburgh, on manufacturers' wire, and \$1.90 to \$2 a keg on nails.

SHEETS

Specifications of some producers showed improvement last week, although demand continues very spotty. The automobile industry has failed to show much interest in its May re-

quirements, and buying by some consumers in that field has been disappointing in volume. Releases for sheet steel from other sources show no marked change. Heavier specifications for galvanized material to be used for roofing purposes are reported from some sources, but the improvement is by no means general. Culvert stock is still active and a fair demand for steel furniture sheets continues. Operations have not declined materially, although production continues to show a slight downward trend. The industry is running at about 40 per cent of capacity.

It is now expected that the recently announced nomenclature for sheet steel products, with the accompanying changes in differentials recently announced to take effect May 1, will be adopted by most makers. Sheet steel sales officials are studying the changes carefully, and further announcements of policy are expected after the first of the month. It is expected that no

THE IRON AGE COMPOSITE PRICES

Finished Steel		Pig Iron	Steel Scrap
April 28, 1931	2.128c. a Lb.	\$15.79 a Gross Ton	\$10.67 a Gross Ton
One week ago	2.128c.	15.79	10.75
One month ago	2.128c.	15.71	11.08
One year ago	2.242c.	17.67	14.08
Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.		Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	
Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.			
High Low		High Low	High Low
1931.....	2.142c., Jan. 13; 2.121c., Jan. 9	\$15.90, Jan. 6; \$15.71, Feb. 17	\$11.33, Jan. 6; \$10.67, April 28
1930.....	2.362c., Jan. 7; 2.121c., Dec. 9	18.21, Jan. 7; 15.90, Dec. 16	15.00, Feb. 18; 11.25, Dec. 9
1929.....	2.412c., April 2; 2.362c., Oct. 29	18.71, May 14; 18.21, Dec. 17	17.58, Jan. 29; 14.08, Dec. 3
1928.....	2.391c., Dec. 11; 2.314c., Jan. 3	18.59, Nov. 27; 17.04, July 24	16.50, Dec. 31; 13.08, July 2
1927.....	2.453c., Jan. 4; 2.293c., Oct. 25	19.71, Jan. 4; 17.54, Nov. 1	15.25, Jan. 11; 13.08, Nov. 22
1926.....	2.453c., Jan. 5; 2.403c., May 18	21.54, Jan. 5; 19.46, July 13	17.25, Jan. 5; 14.00, June 1
1925.....	2.560c., Jan. 6; 2.396c., Aug. 18	22.50, Jan. 13; 18.96, July 7	20.83, Jan. 13; 15.08, May 5

important base price changes will be made at this time. In the meantime, sheet quotations are still weak, but have not shown any definite downward adjustment in the last few days.

TIN PLATE

Although the specifications of one large producer last week were the best in some time, production is barely holding its own, and it is possible that the year's peak in production has been passed. The industry is running at from 75 to 80 per cent of theoretical capacity. The early downward turn in production is apparently caused by heavier than usual anticipated output this year, although lower exports have affected some companies. Shipments thus far in the year have not fallen more than 5 per cent under those of 1930.

STRIP STEEL

Continued price weakness, coupled with declining specifications, has deprived strip producers of most of the gains registered by the industry in February and March. Operations have declined to scarcely 40 per cent of capacity on hot-rolled tonnage and to about 25 per cent on cold-rolled. Losses have largely been due to declining automobile tonnage. May releases for shipment to that all-important industry are still in abeyance. General demand is light, with tonnages small and immediate shipment usually demanded. Hot-rolled strip is now quoted by most mills at 1.50c. to 1.55c., Pittsburgh, for 6 in. and wider and 1.60c. to 1.65c. for the narrower widths. Practically all makers of cold-rolled material have been forced to meet quotations of 2.15c., Pittsburgh, except in Eastern territory.

COAL AND COKE

Business shows little change, although unseasonably cold weather has brought a few rush orders for domestic coal and coke. Furnace coke is quiet, with prices unchanged at \$2.50, Connellsville. Lower quotations are sometimes encountered, but

most sellers feel that further price reductions would not bring out more business. Shipments of Lake cargo coal have not got under way. Prices on steam slack are slightly stronger.

OLD MATERIAL

Continued weakness in the scrap market is reflected principally in the minor grades, with an exception in the case of blast furnace borings and turnings, which have strengthened on the basis of a sale at \$8. A substantial tonnage was involved which may serve to take most of the surplus of this material out of the market. Heavy melting steel is nominally unchanged at \$12 to \$12.50, and hydraulic compressed sheets at 25c. less. Specialties are weaker, and machine shop turnings have declined in the absence of a market. The May list of the Pennsylvania Railroad, on which bids will

be taken May 6, contains 56,500 tons of scrap, including 10,400 tons of heavy melting steel and 12,750 tons of rails. The Baltimore & Ohio list, closing May 4, contains approximately 10,000 tons.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel..	\$12.00 to \$12.50
No. 2 heavy melting steel..	10.75 to 11.25
Scrap rails	12.00 to 12.50
Compressed sheet steel....	11.75 to 12.25
Bundled sheets, sides and ends	10.00 to 10.50
Cast iron carwheels.....	12.50 to 13.00
Sheet bar crops, ordinary..	13.00 to 13.50
Heavy breakable cast....	9.00 to 9.50
No. 2 railroad wrought....	12.00 to 12.50
Hvy. steel axle turnings..	10.00 to 10.50
Machine shop turnings....	6.75 to 7.25
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	15.00 to 15.50
Railr. coil and leaf springs	15.00 to 15.50
Roller steel wheels.....	15.00 to 15.50
Low phos. billet and bloom ends	17.00 to 17.50
Low phos. mill plates....	14.00 to 14.50
Low phos. light grades....	14.00 to 14.50
Low phos. sheet bar crops	15.00 to 15.50
Heavy steel axle turnings..	10.00 to 10.50
Electric Furnace Grades:	
Low phos. punchings....	15.00 to 15.50
Heavy steel axle turnings..	10.00 to 10.50
Blast Furnace Grades:	
Short shoveling steel turnings	7.50 to 8.00
Short mixed borings and turnings	7.50 to 8.00
Cast iron borings.....	7.50 to 8.00
Rolling Mill Grades:	
Steel car axles	17.50 to 18.00
Cupola Grades:	
No. 1 cast	12.00 to 12.50
Rails 3 ft. and under....	14.00 to 14.50

Jones & Laughlin Has Deficit in Quarter

The Jones & Laughlin Steel Corp., Pittsburgh, in the quarter ended March 31, had total earnings of \$1,181,392, and deficit after reserves for depreciation and depletion and bond interest of \$190,982. Preferred and common stock dividends paid during the quarter amounted to \$1,603,813, leaving net deficit for the period of \$1,794,795. Regular dividends of 1% per cent on preferred stock were declared, while a dividend of 1/2 of 1 per cent was voted on common.

Warehouse Prices, f.o.b. Pittsburgh

*Base per Lb.	
Plates	2.85c.
Structural shapes.....	2.85c.
Soft steel bars and small shapes...	2.75c.
Reinforcing steel bars.....	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.35c.
Squares and flats.....	3.85c.
Rands	3.10c.
Hoops	4.10c.
Black sheets (No. 24), 25 or more bundles	3.25c.
Galv. sheets (No. 24), 25 or more bundles	3.60c.
Light plates, blue annealed (No. 10)	2.75c. to 3.00c.
Blue annealed sheets (No. 13),	2.90c. to 3.05c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)....	3.82c.
Spikes, large	2.65c.
Small	2.90c. to 3.05c.
Boat	3.15c.
Track bolts, all sizes, per 100 count,	60 and 10 per cent off list
Machine bolts, 100 count,	60 and 10 per cent off list
Carriage bolts, 100 count,	60 and 10 per cent off list
Nuts, all styles, 100 count,	60 and 10 per cent off list
Large rivets, base per 100 lb.....	\$3.30
Wire, black, soft ann'd, base per 100 lb.	2.40
Wire, galv. soft, base per 100 lb....	2.85
Common wire nails, per keg.....	\$2.10 to 2.15
Cement coated nails, per keg.....	2.15

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 3999 lb.

CHICAGO

Steel Operations Recover Slightly, But Business Is Colorless

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CHICAGO, April 28.—Steel mill output, after receding below 50 per cent, has made a slight gain to about 50 per cent. This change is not significant from the viewpoint of tonnage, but to some it reflects a leveling off which for the time being allays the fear that the often experienced summer recession in business is already at hand. Active steel mill blast furnaces still number 16. Wisconsin Steel Co. has taken out a stack for repairs, but has lighted its third unit, thereby retaining two furnaces in production.

The finished steel market, as judged by sales and specifications, is colorless. New purchases continue to run light, and specifications are no less spotty than at any time during the month.

Price structures are not without weak points, though quotations are holding well in view of the business situation as a whole. Mild steel bars have been sold at as low as 1.70c. a lb., Chicago, and this price will also apply to mixed lots of plates. Competition for rail steel reinforcing bars brought out a sharp but momentary price reduction in Michigan.

The sheet market is moving quietly, with the trade in general accepting present quotations and at the same time studying the new schedule recently adopted by the American Rolling Mill Co.

Prices for pig iron are steady, but the scrap list has receded to new lows, with added weakness bearing heavily against the market.

Steel continues to move by boat from Chicago, and it is reported that the first cargo from Lake Erie will arrive at local docks at an early date.

PIG IRON

If a few thousand tons can be taken as an improvement, April shipments can be said to show an upturn from deliveries in March. The market as a whole is somewhat erratic. Prices for local merchant furnace iron are steady at \$17.50 a ton, but odd lots of dock iron are being offered at lower figures. There are few contracts for the quarter, and therefore new purchases are being made at rather a uniform rate, which is uncommon for this time of year. Releases already received for May do not as yet give a clue to the course that the market will follow in the next four weeks. Malleable foundries are in many instances getting larger orders, but makers of gray iron castings do not find conditions improved. Movement of Southern iron is fair against contracts made before

Steel operations recover to about 50 per cent from slightly below that point.

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Market is colorless, with no significant changes in demand or outlook.

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Price structures have some weak points, but quotations hold fairly well in view of general conditions.

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Scrap prices recede to new low levels, with added weakness overhanging the market.

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the price advance to \$11 a ton Birmingham. Quotations on spot business are steady.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	\$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75	18.00
Malleable, not over 2.25 sil.	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	\$25.04 to 27.04
S'th'n No. 2 fdy.	17.01
Low phos., sil. 1 to 2, copper free	28.50 to 29.20
Silvery, sil. 8 per cent.	26.79
Bess. ferrosilicon, 14-15 per cent	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

WAREHOUSE BUSINESS

New orders both as to number and aggregate tonnage showed very little variation in the last half of April. Prices are holding on standard lines, but there is some variation in quotations on specialties.

HOT-ROLLED STRIP

Demand for this commodity has grown slightly and output is several points above current ingot production, which stands close to 50 per cent of capacity. Hot strip mills are estimated to be shipping between 50 and 55 per cent of capacity.

CAST IRON PIPE

Inquiries have taken rather a sharp turn for the better and the prospects for additional tonnage to be figured in May are excellent. Many Midwestern towns have well-advanced plans for improvements and enlargements to existing water systems. Engineering plans for many of these are near completion, and barring unforeseen delays, a fair number of these plans should be out for estimating

purposes some time in May, which is about the time when municipalities usually get under way with work of this kind. Among purchases this week was 500 tons ordered by Canton, Ohio, from the United States Pipe & Foundry Co. Among fresh inquiries is 400 tons of 20 and 24-in. pipe for Huron, S. D., 300 tons for Cedar Rapids, Iowa, 16,000 ft. of 6 to 12-in. Class C pipe for Appleton, Wis., which will take alternate bids on centrifugal pipe, and 1136 tons of 6 to 20-in. Class C pipe for Milwaukee, bids May 5. The Milwaukee inquiry includes some specials.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over \$43 to \$44; 4-in., \$46 to \$47; Class A and gas pipe, \$3 extra.

RAILS AND TRACK SUPPLIES

It is reported that the Great Northern has purchased 16,000 tons of rails from Bethlehem Steel Co. in addition to the 9000 tons reported as ordered last week from the Colorado mill. The Minneapolis & St. Louis has closed for 3000 tons, of which 2000 tons went to Illinois Steel Co. and the remainder to Inland Steel Co. Rail production is slightly variable from week to week, output in recent weeks having remained in the limits from 45 to 50 per cent of capacity. A few odd lots of track supplies have been added to makers' books. The light rail market is extremely dull.

SHEETS

The Western sheet market has made little or no headway recently, and output is slightly under 50 per cent of capacity. The units at Milwaukee are at 50 per cent, and some other hot mills in this district did not start rolling until Tuesday. Although orders are quite numerous, they are invariably small, representing only the immediate needs of consumers. The roofing business has fallen far short of its usual upturn at this time of year and the furniture manufacturing industry is all but at a standstill. Orders from jobbers reflect distribution, which is of fair size and more stable than earlier in the spring.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.40c. to 2.50c.; No. 24 galv., 2.95c. to 3.05c.; No. 19 blue ann'd, 2.60c. to 2.10c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

BOLTS, NUTS AND RIVETS

Some improvement in total specifications is bringing shipments in April about in line with the volume moved in

March. Jobbers' needs, though spotty, are heavier and automobile and parts manufacturers have gained some ground. Spot buying is very light.

PLATES

This market is showing little variation from one day to another. Of interest in the pipe market is an inquiry from Salt Lake City, Utah, for 1250 tons of steel pipe, which may be of the riveted type. Shipments of skelp are unchanged in volume, and delivery schedules for coming weeks indicate a steady consumption. The railroad car market is dormant. The use of steel for car and locomotive repairs is spotty and light. No increase of steel demand from this source is in sight. The Great Northern continues to press forward its car rebuilding program which was announced last November.

BARS

Demand for bars has failed to hold the gain made in the third week in April. The loss, however, is not large and probably reflects no more than the variation that can be expected in a market such as this. Several large automobile manufacturers are said to be issuing inquiries for last half needs. In the meantime, shipments by local mills to the motor industry are reasonably steady. Buying of rail steel bars is dull, but specifications are unchanged in volume. The bed industry continues to gain headway as indicated by its use of this commodity.

REINFORCING BARS

With estimating departments operating only about 50 per cent of normal for this time of the year, competition is increasingly severe and prices are weak. Billet reinforcing bars out of warehouses are now commonly quoted at 1.90c. to 2c. a lb. This situation is more critical than the tonnage being estimated indicates for the reason that a larger-than-usual volume of inquiries fall by the wayside without becoming orders. Road work is prominent in current news. One dealer has taken 400 tons in new business, and jobbers' orders at one rail steel bar mill aggregate about 500 tons. Among the active inquiries of large size is the Outer Bridge development at Chicago, requiring 900 tons.

The Illinois State Highway Department has let contracts for 21 road projects, calling for 80 miles of paving, grading and widening at a cost of \$1,445,321. So far this year the department has let contracts for \$7,500,000 worth of work, which combined with the \$11,000,000 in contracts let and carried over from last year, completes about one-third of the \$45,000,000 program for the current year. The largest letting of the year will be held at Springfield May 12, when 165 miles of paving, 26 miles of grading and 21 bridges will be awarded.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes.....	3.00c.
Soft steel bars.....	2.90c.
Reinforcing bars, billet steel.....	1.90c. to 2.00c.
Rail steel reinforcement.....	1.50c. to 1.75c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.35c.
Plats and squares.....	3.85c.
Bands, $\frac{3}{8}$ in. (in Nos. 10 and 12 gages).....	3.10c.
Hoops (No. 14 gage and lighter).....	3.65c.
Black sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.35c.
Blue ann'd sheets (No. 10).....	3.35c.
Spikes $\frac{3}{8}$ in. and larger.....	3.45c.
Track bolts.....	4.30c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.
Per Cent Off List	
Machine bolts.....	60 and 10
Carriage bolts.....	60 and 10
Coach and lag screws.....	60 and 10
Hot-pressed nuts, sq., tap, or blank,.....	60 and 10
Hot-pressed nuts, hex., tap, or blank,.....	60 and 10
No. 8 black ann'd wire, per 100 lb.....	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c'd nails, base per keg.....	2.30

STRUCTURAL MATERIAL

The South Park Commissioners, Chicago, are planning a special meeting to award the contract for 6000 tons of steel for the Outer Bridge, bids on which have been taken. A number of Western States are preparing to open bids on additional bridges, and the Pennsylvania will need about 4000 tons for track elevation work in and near Chicago. Shop operations have gained little headway in April. Reports are again heard that some of the contracts for the Chicago Post Office will be let in May.

WIRE PRODUCTS

Producers of these commodities are still feeling the effects of heavy specifications entered by jobbers at the end of March, with the idea in mind of closing out old contracts made for delivery in the first quarter. The result is that current releases are small, but shipments remain fairly steady, indicating that jobbers are not finding wide variation in sales. General rains continue to bolster feeling over large areas of the grain belt. Rains also have done much to improve conditions in the Northwest, where early seeding has made satisfactory progress. Small and frequent orders from the manufacturing trade are coming in at about the rate in recent weeks. Reports are current that several large automobile manufacturers are sending out inquiries for delivery in the last half. Wire mill output ranges from 40 to 45 per cent of capacity.

COKE

Beyond the more rapid movement of domestic coke, which is at the low price of the year, there is little of interest in this market. Consumption of by-product foundry coke has varied little since the middle of March. Prices are steady at \$8 a ton, local ovens.

OLD MATERIAL

Prices have declined for the second consecutive week. Heavy melting

steel has been sold for as little as \$9.75 a gross ton, delivered consumers' yards. Brokers are trading in this grade at \$9 a ton, delivered. Railroad offerings are being bid in in the range from \$9.25 to \$9.50 a gross ton, delivered. Dealers in entering bids with railroads are careful to specify deliveries, offering higher prices for deliveries of one to two weeks than for shipments in 30 or more days. This situation reflects staleness in new buying by consumers and the near expiration of old orders. Brokers are choosing items carefully from railroad lists, this note of caution being necessary because of stagnant demand and the difficulty of placing scrap once it appears on track.

Prices deliv'd Chicago district consumers:

	Per Gross Ton
Basic Open-Hearth Grades:	
Heavy melting steel.....	\$9.25 to \$9.75
Shoveling steel.....	9.25 to 9.75
Frogs, switches and guards, cut apart, and misc. rails	9.50 to 10.00
Factory hyd. comp. sheets	7.25 to 7.75
Drop forge flashings.....	6.00 to 6.50
No. 1 busheling.....	7.00 to 7.50
Forg'd cast and r'd steel carwheels.....	11.50 to 12.00
Railroad tires, chrg. box size.....	11.75 to 12.25
Railroad leaf springs cut apart.....	11.75 to 12.25
Axle turnings.....	8.00 to 8.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles.....	9.75 to 10.25
Coil springs.....	11.00 to 11.50
Electric Furnace Grades:	
Axle turnings.....	8.00 to 8.50
Low phos. punchings.....	10.75 to 11.25
Low phos. plates, 12 in. and under.....	11.00 to 11.50
Blast Furnace Grades:	
Cast iron borings.....	4.00 to 4.25
Short shoveling turnings.....	3.75 to 4.25
Machine shop turnings.....	3.75 to 4.25
Rolling Mill Grades:	
Rerolling rails.....	11.25 to 11.75
Cupola Grades:	
Steel rails, less than 3 ft.....	10.75 to 11.25
Steel rails, less than 2 ft.....	11.75 to 12.25
Angle bars, steel.....	10.00 to 10.50
Cast iron carwheels.....	9.50 to 10.00
Malleable Grades:	
Railroad.....	10.25 to 10.75
Agricultural.....	9.75 to 10.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.....	19.00 to 21.00
*Relaying rails, 65 lb. and heavier.....	22.00 to 27.00
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars.....	9.50 to 10.00
Iron arch bars, and transoms.....	10.50 to 11.00
Iron car axles.....	17.50 to 18.50
Steel car axles.....	12.50 to 13.00
No. 1 railroad wrought.....	8.00 to 8.50
No. 2 railroad wrought.....	8.00 to 8.50
No. 1 busheling.....	6.00 to 6.50
No. 2 busheling.....	4.00 to 4.50
Locomotive tires, smooth.....	11.50 to 12.50
Pipes and flues.....	5.50 to 6.00
Cupola Grades:	
No. 1 machinery cast.....	9.00 to 9.50
No. 1 railroad cast.....	7.50 to 8.00
No. 1 agricultural cast.....	7.00 to 7.50
Stove plate.....	6.25 to 6.75
Grate bars.....	6.25 to 6.75
Brake shoes.....	6.50 to 7.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Sales by 118 plants of bolts, nuts, washers and rivets in 1929 by manufacturers not associated with rolling mills were valued at \$108,006,000, of which \$74,970,000, or 69.4 per cent, was made direct to industrial consumers, according to the Bureau of the Census.

CLEVELAND

Steel Business in Steady Volume— Operations Unchanged

CLEVELAND, April 28—Nothing developed in the market the past week to indicate any material change in conditions. Orders were light and for small lots. Business with most consuming industries remains at recent levels. That business is maintained at its present volume is due largely to the motor car industry and to the demands for reinforcing bars for building construction and road building. Total tonnage of heavier rolled steel products booked this month will show a slight loss as compared with March. Steam shovel manufacturers have a good volume of orders and are operating well. Miscellaneous requirements from railroads in this territory are negligible and releases of rail tonnage for May rolling are being made rather slowly.

Not much new tonnage came from the motor car industry during the week and specifications from that source for steel bars and hot-rolled strip steel have declined slightly. However, rather encouraging reports are coming from the motor car manufacturers, and it is expected that May production will at least equal that of April. One Cleveland steel plant put on an open-hearth furnace during the week and another shut down one furnace, leaving operations unchanged at 56 per cent of ingot capacity.

The new sheet classifications issued by a leading producer have attracted much attention and favorable comment, and it is expected that the changes will be generally adopted, although so far only one or two Ohio mills have definitely announced that they will follow the new plan. Some sheet business has been held back pending the placing of the new classifications in effect. Steel prices are fairly steady, although the market lacks strength. Some grades of scrap are lower.

PIG IRON

Inquiry gained slightly during the week. The Westinghouse Electric & Mfg. Co. has sent out an inquiry for an unspecified tonnage of foundry iron for the last half of the year for its Cleveland and Trafford City plants. Several other inquiries for lots of from 200 to 500 tons are pending. Shipments so far this month are slightly ahead of those of March, the improvement being from industries outside of the motor car field. Foundries that are operated as departments of companies making various lines of products as a rule are operating better than jobbing foundries. Business with the latter continues to be slack. Prices of foundry and malleable iron appear to be steady at \$16 to \$17, Lake fur-

nace, for Ohio and Indiana, \$17 to \$17.50 for Michigan and \$17, Cleveland, for local delivery. Quotations below \$11, Birmingham, for Southern foundry iron seem to have disappeared.

PIG IRON

Prices per gross ton at Cleveland:
N'th'n fdy., sil. 1.75 to 2.25.....\$17.00
S'th'n fdy., sil. 1.75 to 2.25.....17.01
Malleable.....17.50
Ohio silvery, 8 per cent.....25.00
Stand. low phos., Valley.....27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

IRON ORE

Interest in the ore market since the reestablishment of last season's prices has been very slight. No inquiry is coming out, and additional requests have come from consumers having long-term contracts that they be allowed to take less ore this season than the minimum called for in their contracts. A few consumers have such large stocks that they do not expect they will need any more ore this year. There has been a further suspension of operation of underground mines, and some of the open-pit properties will not be operated this year.

WIRE PRODUCTS

Jobbers have specified rather freely against \$1.90 a keg contracts for nails, and have good stocks. With requirements of consumers also covered by old contracts, there has been no test of the \$2 price. Efforts to secure concessions from the new 2.30c. price for manufacturers' wire seem to have proved unsuccessful.

BOLTS, NUTS AND RIVETS

The volume of business in these products during April will show very little change from February. Demand

for bolts and nuts is light from all consuming industries, and jobbers are buying in less volume than usual at this time of the year. The industry is operating at about 50 per cent of capacity. Prices are well maintained.

STRIP STEEL

With less business from the automotive industry, demand for hot-rolled strip tapered off somewhat the past week, causing curtailment in operations by some of the mills. Concessions of \$1 a ton are still reported, mostly on wide strip. This ranges from 1.50c. to 1.55c., Pittsburgh, and narrow material is \$2 a ton higher. Cold-rolled strip is moving moderately well to diversified industries outside of the motor car field. The price is steady at 2.25c., Cleveland.

SHEETS

While some of the mills took a fair volume of small orders, sheet business in the aggregate was light the past week. Following the recent spurt from the motor car industry, specifications from that source declined. The refrigerator, stove and barrel industries are ordering in moderate quantities. The price situation shows little change. Much of the black sheet tonnage placed in the past two weeks by the motor car industry has gone at 2.15c., Pittsburgh, and that price has been quoted to barrel manufacturers. However, strong resistance is being made against concessions from the 2.25c. price. While quotations on galvanized sheets range from 2.80c. to 2.90c., a price above 2.85c. seems to have about disappeared.

SEMI-FINISHED STEEL

Consumers are buying in small lots as needed. The local producer claims to be holding to \$30, Cleveland or Youngstown, for sheet bars, billets and slabs in spite of pressure for lower prices.

BARS, PLATES AND SHAPES

Bar business from the motor car industry has declined somewhat from recent volume. Reinforcing bars are moving fairly well for building and road work, although most jobs are small. Structural shapes are quiet. The outstanding award of the week was 700 tons for John Carroll University, Cleveland. The building outlook is not encouraging. Demand for plates is confined to car lots. While steel bars are being maintained at 1.70c. for Cleveland delivery, a 1.65c. Cleveland base for outside shipment has become more widespread. On

(Concluded on page 1489)

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes.....	2.95c.
Soft steel bars.....	2.85c.
Reinforc. steel bars.....	2.25c. to 2.50c.
Cold-fin. rounds and hex.....	3.40c.
Cold-fin. flats and sq.....	3.90c.
Hoops and bands, No. 12 to 3 in. inclusive.....	3.10c.
Hoops and bands, No. 13 and lighter.....	3.65c.
Cold-finished strip.....	*5.95c.
Black sheets (No. 24).....	3.60c.
Galvanized sheets (No. 24).....	4.00c.
Blue ann'l'd sheets (No. 10).....	3.10c.
No. 9 ann'l'd wire, per 100 lb.....	\$2.35
No. 9 galv. wire, per 100 lb.....	2.80
Com. wire nails, base per keg.....	2.25

*Net base, including boxing and cutting to length.

NEW YORK

Steel Buying Tapers Off— Pig Iron Market Dull

NEW YORK, April 28.—Apathy in the pig iron market is unrelieved. Sales are limited almost entirely to 50 to 100-ton lots. Virtually the only open inquiry of any size is one for 500 tons of ballast iron. A specific analysis is asked for so that the iron may be sold for melting purposes after it has served as ballast. In view of the low rate of activity, no new light has been thrown on prices. Sales for the week totaled less than 3000 tons, compared with 4500 tons in the two previous weeks.

Witherbee, Sherman & Co. are expected to buy in one of their two little Port Henry, N. Y., furnaces about the middle of May.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75	
to 2.25	\$19.91 to \$20.41
*Buff. No. 2, del'd east.	
N. J.	18.28 to 18.78
East. Pa. No. 2 fdy., sil.	
1.75 to 2.25	17.39 to 17.89
East. Pa. No. 2X fdy., sil.	
2.25 to 2.75	17.89 to 18.39

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

FINISHED STEEL

Sales of finished steel have begun to taper off slightly. Most steel companies selling in this district have experienced at least a moderate slump in orders in the past week, although in some instances the volume for April will fall not far short of the March total. The market is devoid of new features.

REINFORCING BARS

On recent business 1.65c. a lb., Pittsburgh, or 1.99c., New York, has been slightly firmer, but \$1 to \$2 a ton concessions still appear on the larger and more desirable tonnages. The only sizable bar project of the past week is the first section of the Sixth Avenue subway, which will require about 450 tons.

WAREHOUSE BUSINESS

Buying continues at a better level than in the first quarter of the year, but is generally restricted to small lots. April business showed a slight improvement over that of the previous month with most jobbers in this district.

CAST IRON PIPE

Operating rates of Northern foundries are estimated at 50 to 60 per cent, but the total of new business is decidedly small, and curtailment of production would not be unexpected. The W. H. Gahagan Co., New York, has been awarded the contract for a

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and struc. shapes....	2.70c. to 3.10c.
Soft steel bars, small shapes....	2.70c. to 3.10c.
Iron bars.....	3.24c.
Iron bars, Swed. charcoal....	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.
Cold-roll, strip, soft and quarter	
hard.....	4.95c.
Hoops.....	3.75c.
Bands.....	3.40c.
Blue ann'd sheets (No. 10)....	3.00c. to 3.25c.
Black sheets (No. 24*).....	3.50c.
Galvanized sheets (No. 24*)....	4.00c.
Long terme sheets (No. 24)....	5.00c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galv. annealed.....	5.15c.
Tire steel, ½ x ½ in. and larger..	3.40c.
Smooth finish, 1 to 2½ x ¼ in.	
and larger.....	3.75c.
Open-hearth spring steel, bases,	
4.50c. to 7.00c.	
No. 28 and lighter, 36 in. wide, 20c.	
higher per 100 lb.	
Machine bolts, cut thread:	Per Cent
¾ x 6 in. and smaller.....	Off List
1 x 30 in. and smaller.....	.65 to .65 and 10
Carriage bolts, cut thread:	
¾ x 6 in. and smaller.....	.65 to .65 and 10
¾ x 20 in. and smaller.....	.65 to .65 and 10
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.....	\$19.00
Seamless steel, 2-in.....	20.25
Charcoal iron, 2-in.....	26.25
Charcoal iron, 4-in.....	67.00

garbage disposal plant on Ward's Island, New York, and is expected to place 3700 tons of pipe in the next few days. Spring Lake, N. J., opens bids April 29 on 1000 tons of 6 to 10-in. water pipe. Prices still lack firmness, but are generally unchanged in the absence of substantial business.

Prices per net ton deliv'd New York:
Water pipe, 6-in. and larger, \$34.90 to \$35.90; 4-in. and 5-in., \$37.90 to \$38.90; 3-in., \$44.90 to \$45.90. Class A and gas pipe, \$3 extra.

COKE

Specifications are slack and prices remain weak, with furnace coke available at \$2.25 a net ton, Connellsville, and foundry coke at \$3.25 to \$3.50, Connellsville. Other coke quotations follow:

Special brands of beehive foundry coke, \$4 to \$4.25 a net ton, ovens, or \$7.71 to \$7.96, delivered to northern New Jersey, Jersey City and Newark, and \$8.59 to \$8.84 to New York and Brooklyn; by-product foundry coke, \$9 to \$9.40, Newark or Jersey City; \$10.06, New York or Brooklyn.

OLD MATERIAL

Although lower scrap freight rates from this district to eastern Pennsylvania consuming points are effective on the Pennsylvania Railroad, brokers are not increasing their buying prices, as the market on most grades is slightly weaker. No. 1 heavy melting steel is moving to a Coatesville, Pa., consumer, which in the past week closed on about 10,000 tons at \$10.50

a ton, delivered, and shipments of this grade are still going by barge to Buffalo, for which \$7 and \$7.25 a ton, on barge, New York, is quoted.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel..	\$6.50 to \$7.25
Heavy melting steel (yard) ..	4.25 to 4.75
No. 1 hvy. breakable cast..	6.75 to 7.50
Stove plate (steel works)...	4.75
Locomotive grate bars....	4.75
Machine shop turnings....	3.00
Short shoveling turnings...	3.00
Cast borings (blast fur. or	
steel works).....	3.00
Mixed borings and turn-	
ings.....	2.50 to 3.00
Steel car axles.....	12.50 to 13.00
Iron car axles.....	16.50 to 17.00
Iron and steel pipe (1 in.	
dia., not under 2 ft. long)	7.25
Forge fire.....	5.50 to 6.00
No. 1 railroad wrought....	8.75
No. 1 yard wrought, long..	7.75
Rails for rolling.....	8.75 to 9.25
Stove plate (foundry)....	5.50 to 6.00
Malleable cast (railroad)...	8.50 to 9.00
Cast borings (chemical)...	8.00 to 8.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast.....	\$12.50
No. 1 hvy. cast (columns, bldg. ma-	
terials, etc.); cupola size.....	10.50
No. 2 cast (radiators, cast boilers,	
etc.)	10.00

Steel Corporation Earns 5c. a Share

Earnings of the United States Steel Corporation in the first quarter of this year available for common dividends were a shade over 5c. a share. The regular dividend of \$1.75 for the quarter was declared, taking \$14,763,240 from the surplus for this purpose.

Corresponding earnings of the fourth quarter of 1930 were a little over 27c. a share, but income then was increased by \$3,695,426, representing a quarterly apportionment of net interest on Federal tax refunds, and there thus became available for common dividends 70c. a share.

From regular operations the net income before deductions for dividends was \$6,765,057 for the quarter ended March 31 and \$8,670,662 for the quarter ended Dec. 31, 1930. Gross earnings for the quarter just reported on were \$19,464,836; charges and allowances for depletion, depreciation and obsolescence amounted to \$11,325,302; interest on bonds totaled \$1,374,477. The common dividend covered 8,699,073 shares.

Crude magnesite mined in the United States in 1930 totaled 129,320 net tons, with an approximate value of \$1,033,130, according to reports furnished by producers to the United States Bureau of Mines. This represents a decrease of 31 per cent from the quantity mined in 1929 (187,660 tons).

PHILADELPHIA

Steel Buying Smaller—Radio Makers Increase Output

PHILADELPHIA, April 28.—Steel buying is at a low level, but, with consumers' stocks at a minimum and their operating rates generally unchanged, sellers expect no further decline in the volume of their business in the coming month. Radio manufacturers here are beginning to increase operations, with two of the three leading makers producing about 2000 sets a day, mostly small units.

While prices of plates, shapes and bars are fairly well maintained, sheet quotations continue to be irregular, with \$1 and \$2 a ton concessions granted to distributors and preferred buyers. Although only one or two sheet producers have so far formally adopted the new sheet classification announced by the American Rolling Mill Co., other makers are expected to follow in the next few days.

PIG IRON

Eastern Pennsylvania consumers of foundry iron are maintaining the rates of operation prevailing in the past month and more. Buying, however, continues to be limited to carload lots for prompt shipment, and on this business \$17 a ton usually applies, with concessions of 50c. a ton occasionally granted on the more substantial purchases. Southern pig iron is unchanged at \$11, Birmingham, and only small lots are moving at this price. Indian basic iron is still being imported for eastern Pennsylvania consumers. While imports of Indian iron last year, both basic and foundry grades, are estimated as 90,000 tons, it is said that the total may be considerably smaller in 1931. The Washington Navy Yard, which recently closed on a tonnage of low phosphorus iron with an importer of the British product, is again in the market and will open bids May 5 on 224 tons.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$17.76 to \$18.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	18.26 to 18.76
East. Pa. No. 1X.	18.76 to 19.26
Basic (del'd east. Pa.)	17.00 to 17.25
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

STEEL BARS

Deliveries of steel bars are still being made on protections at 1.60c., Pittsburgh, or 1.89c., Philadelphia, extended from the first quarter, but on new business mills are quoting 1.65c., Pittsburgh, or 1.94c., Philadelphia, and on miscellaneous specifications

1.70c., Pittsburgh, or 1.99c., Philadelphia, is occasionally asked. Billet steel reinforcing bars are quoted at 1.65c., Pittsburgh, for small lots and concessions of \$1 and \$2 a ton are not uncommon on the more desirable projects. Rail steel bars are quoted at 1.20c. to 1.35c., Pittsburgh, or 1.49c. to 1.64c., Philadelphia. In the past week about 600 tons of reinforcing bars for the Market Street subway extension have been awarded. The Pennsylvania Railroad's requirement of 8000 tons for electrification work has not yet been placed, and, with the market exhibiting considerable irregularity, it is believed in some quarters that new bids may be taken.

PLATES

Sales are generally limited to small lots for prompt shipment, with 1.75c., Coatesville, or 1.85½c., Philadelphia, applying on new business. Tonnage is still moving to consumers with extended first quarter protections at 1.70c., Coatesville, or 1.80½c., Philadelphia. On small miscellaneous specifications, mills occasionally obtain 1.80c., Coatesville, or 1.90½c., Philadelphia.

SHAPES

The current quotation on new business is 1.75c., f.o.b. nearest mill to consumer, or 1.81c., Philadelphia, with 1.80c., mill, or 1.86c., Philadelphia, quoted on small miscellaneous lots. A fair tonnage of material, however, is moving to users on protections carried over from the first quarter at 1.70c., mill, or 1.76c., Philadelphia.

WAREHOUSE BUSINESS

Jobbers have reduced black sheets \$2 a ton to 3.50c. a lb., base, and galvanized \$4 a ton to 3.95c., base. The volume of business in the past month has been fair, but considerably under the usual total at this season.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform.	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ¼-in. inclu.	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.50c.
†Galvanized sheets (No. 24)	3.95c.
Light plates, blue annealed (No. 10)	3.05c.
Blue ann'd sheets (No. 13)	3.20c.
Diam. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 40 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

SHEETS

Orders are small and generally for prompt shipment, as consumers are operating with only limited stocks of material to draw upon. Black sheets are quoted at 2.25c., Pittsburgh, or 2.54c., Philadelphia, and galvanized at 2.85c., Pittsburgh, or 3.14c., Philadelphia. Distributors and preferred buyers commonly receive concessions of \$1 and \$2 a ton from these quotations. Blue annealed sheets, No. 13 gage, are quoted at 2c., Pittsburgh, or 2.29c., Philadelphia, and the trend on recent business has been toward the lower end of the range. Blue annealed plates are 1.85c., Pittsburgh, or 2.14c., Philadelphia. When competition is encountered from the product of the continuous mill in the narrower specifications, these prices are subject to concessions.

IMPORTS

In the week ended April 25, 6800 tons of iron ore arrived at this port from Algeria, 100 tons of chrome ore was received from Turkey and 25 tons of ferrochrome came in from Switzerland. Steel imports consisted of 267 tons of structural shapes and 45 tons of steel bars from Belgium, 50 tons of steel strip from France, and 15 tons of steel bars and three tons of structural shapes from Germany.

OLD MATERIAL

A leading consumer of No. 1 heavy melting steel in this district has closed on about 10,000 tons at \$10.50 a ton, delivered, but the market is otherwise quiet. All grades of scrap are generally unchanged in price.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$10.00 to \$10.50
No. 2 heavy melting steel	8.00 to 8.50
Heavy melting steel (yard)	7.50 to 8.00
No. 1 railroad wrought	11.00 to 11.50
Bundled sheets (for steel works)	9.00
Hydraulic compressed, new	9.00 to 9.50
Hydraulic compressed, old	7.50 to 8.00
Machine shop turnings (for steel works)	6.50 to 7.00
Heavy axle turnings (or equiv.)	9.50 to 10.00
Cast borings (for steel works and roll. mill)	7.50
Heavy breakable cast (for steel works)	11.00 to 11.50
Railroad grate bars	9.00
Stove plate (for steel works)	9.00
No. 1 low phos. hvy. (0.04% and under)	15.50 to 16.00
Couplers and knuckles	14.00 to 14.50
Rolled steel wheels	14.00 to 14.50
No. 1 blast fnace scrap	6.00
Wrot. iron and soft steel pipes and tubes (new specific.)	11.50
Shafting	18.00
Steel axles	16.50 to 17.00
No. 1 forge fire	10.00
Cast iron carwheels	12.50 to 13.00
No. 1 cast	12.00 to 12.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling	12.50 to 13.00

BOSTON

Pig Iron Sales at Low Ebb—Scrap Inactive and Weak

BOSTON, April 28.—Pig iron sales the past week were less than 1200 tons, of which furnaces east-of-Buffalo took more than two-thirds. Prices on east-of-Buffalo iron are still unsettled, although indications are that a stack which has been making low prices now has a comfortable backlog. Last week it sold a car of malleable iron to a Rhode Island consumer at \$19.15 a ton, delivered. Indian iron for May delivery has been moderately active at \$19 to \$20 a ton, on dock here, duty paid. Foundries are holding up iron shipments, and collections are reported as slower than they have been since 1921. The melt of western Massachusetts foundries is increasing, but in other sections of New England it does not average more than 25 per cent of capacity.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25...	\$19.91 to \$20.91
*Buffalo, sil. 2.25 to 2.75...	19.91 to 20.91
*Ala., sil. 1.75 to 2.25...	20.11 to 20.61
*Ala., sil. 2.25 to 2.75...	20.61 to 21.11
†Ala., sil. 1.75 to 2.25...	16.75
†Ala., sil. 2.25 to 2.75...	17.25

Freight rates: \$4.91 all rail from Buffalo; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

FABRICATED STEEL

Massachusetts has awarded 5400 ft. of 60-in. welded steel pipe to the C. & R. Construction Co. at \$95,145. Numerous small tonnages of fabricated steel were awarded the past week. A Maine bridge calling for 1158 tons of steel was the largest new development, and another Maine

bridge requiring more than 700 tons will soon be figured.

REINFORCING BARS

Awards in the week were about 400 tons, including 225 tons for a Beacon, N. Y., hospital. Connecticut will soon award 400 tons for various projects, and Boston will buy 250 tons for a Charlestown district school. Billet bars from stock are: 1 to 5-ton lots, 3c. a lb., base; 6 to 99-ton lots, 2.40c.; 100-ton lots and larger, 2.30c. Rail steel bars are 2.26½c. a lb., delivered Boston rate points.

OLD MATERIAL

Business is confined to scattered car lots of No. 1 heavy melting steel, T rails, bundled skeleton, forge flashings, forge scrap for Pennsylvania delivery, breakable cast for local delivery and textile cast for New England foundry consumption. No. 1 heavy melting steel, T rails and breakable cast are selling at \$6 to

\$6.25 a ton, on cars shipping point; skeleton, forge flashings and forge scrap at \$5 to \$5.25 on cars, and textile cast at \$9 to \$10, delivered in foundry yards. The Boston Elevated Railway last week closed bids on a small list, the most important item of which was 500 tons of girder rails, but has made no awards.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel...	\$6.00 to \$6.25
Scrap T rails.....	6.00 to 6.25
Scrap girder rails.....	5.00 to 5.25
No. 1 railroad wrought...	7.00 to 7.50
Machine shop turnings...	2.00 to 2.50
Cast iron borings (steel works and rolling mill)	2.00 to 2.50
Bundled skeleton, long...	5.00 to 5.25
Forge flashings.....	5.00 to 5.25
Blast furnace borings and turnings	2.00 to 2.50
Forge scrap.....	5.00 to 5.25
Shafting	13.00 to 13.50
Steel car axles.....	14.00 to 15.00

Wrought pipe, 1 in. in diameter (over 2 ft. long)	5.60 to 6.10
Rails for rolling.....	8.50 to 9.00
Cast iron borings, chemical	9.00 to 9.60
No. 2 cast.....	5.10 to 5.60

Prices per gross ton deliv'd consumers' yards:

Textile cast.....	\$9.00 to \$10.00
No. 1 machinery cast.....	9.00 to 10.00
Stove plate.....	7.00 to 7.25
Railroad malleable	13.00 to 13.50

BIRMINGHAM

Steel Business at Fairly Steady Level—Pig Iron Buying Spotty

BIRMINGHAM, April 28.—Pig iron buying is spotty, and shipments are lagging behind those of last month. Routine business continues in small lots. Quotations remain at \$12 to \$13. With the exception of curtailed shipments, the market has changed little in recent weeks. Thirteen furnaces are in blast, this number having been maintained all month.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	\$12.00 to \$13.00
No. 1 fdy., 2.25 to 2.75 sil.	12.50 to 13.50
Basic	12.00 to 13.00

CAST IRON PIPE

The spring season still has not provided the increased tonnage that was expected and usually is placed. There is a fair run of customary general tonnage, but this has not accumulated in sufficient quantity to improve market conditions to any extent. Plant operations, at 60 to 65 per cent, have been on the same level for a month or so. Delays in municipal financing and proposed bond issues have held back considerable tonnage that was anticipated. Prices still are on a \$35 to \$36 basis.

FINISHED STEEL

New tonnage in various lines is fluctuating from week to week, but the aggregate is being maintained at an even level. Seaboard Air Line has placed an order with the Tennessee Coal, Iron & Railroad Co. for 4000 tons of rail. This is the first rail order here since January. Fabrica-

tors of structural steel and reinforcing bars are booking small orders at a fair rate, with an occasional large contract. Nashville Bridge Co. has secured 1100 tons of structural steel for a bridge over the Black River at Jonesville, La. Connors Steel Co. has secured 250 tons of bars for the Mississippi insane hospital at Whitfield and 250 tons for wharf work at New Orleans. The Tennessee company is operating 13 open-hearths, as compared with 12 last week, and Gulf States Steel continues with three, a total of 16 active of the 23 in the district.

OLD MATERIAL

Buying is light again, following the purchase of a large tonnage by one of the steel companies, as reported last week. No price changes are reported.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:

Heavy melting steel.....	\$9.50 to \$10.00
Scrap steel rails.....	10.00
Short shoveling turnings...	7.50
Cast iron borings.....	(No market)
Stove plate.....	7.50
Steel axles.....	15.00 to 16.00
Iron axles.....	18.00
No. 1 railroad wrought...	8.00
Rails for rolling.....	11.50 to 12.00
No. 1 cast.....	10.00
Tramcar wheels.....	11.00 to 11.25
Cast iron borings, chem....	13.50
Cast iron carwheels.....	11.00

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.36½c.
Structural shapes—	
Angles and beams.....	3.36½c.
Tees	3.36½c.
Zees	3.36½c.
Soft steel bars, small shapes...	3.26½c.
Reinforcing bars	3.11½c. to 3.26½c.
Iron bars—	
Refined	3.26½c.
Best refined.....	4.60c.
Norway rounds	6.60c.
Norway squares and flats.....	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.....	3.50c. to 5.50c.
Squares and flats.....	4.00c. to 6.00c.
Toe calk steel.....	6.00c.
Rivets, structural or boiler.....	4.80c.

Per Cent Off List

Machine bolts.....	60 and 5
Carriage bolts.....	60 and 5
Lag screws.....	60 and 5
Hot-pressed nuts.....	60 and 5
Cold-punched nuts.....	60 and 5
Stove bolts.....	70 and 10

Chain Belt Co., Milwaukee, has moved its Buffalo office from 753 Elliott Square to 1807 Elmwood Avenue. T. E. Cocker is district manager.

ST. LOUIS Pig Iron Demand Declining—Scrap Dull and Prices Weak

ST. LOUIS, April 28.—Demand for pig iron in the St. Louis district has been declining since the middle of March. Second quarter buying has been disappointing to makers. The melt of the steel mills and jobbing foundries has been unsatisfactory. Advance sales by manufacturers of stoves and heating apparatus are said to be the smallest for this period in more than 20 years. Prices are unchanged, but how firm they are cannot be determined until there is a buying movement of some proportions. The St. Louis Gas & Coke Corp. reports that shipments of pig iron during April will be about equal to those of March.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b.	
Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd	15.42
Northern malleable, deliv'd	19.66
Northern basic, deliv'd	19.66

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

FINISHED STEEL

April business for the Granite City Steel Co. is about on a par with that of March. Demand for tin plate continues in satisfactory volume. Prices are not as stable as they were earlier in the month. Business is quiet with jobbers, and the seasonal expansion of the general manufacturing trade has been disappointing. The only reinforcing bar award of the week was 125 tons to the Laclede Steel Co. for a bridge at Prairie du Chien, Wis. Promoters have decided to go ahead with an office building in Oklahoma City, Okla., the award of 3500 tons for which was reported in October, 1929, to the Mississippi Valley Structural Steel Co.

OLD MATERIAL

The old material market was extremely quiet during the last week.

Warehouse Prices, f.o.b. St. Louis

Base per Lb.	
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shaftings, screw stock	3.60c.
Black sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.60c.
Blue ann'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.10c.
Galv. corrug. sheets	4.65c.
Structural rivets	4.15c.
Boiler rivets	4.15c.

Per Cent Off List

Tank rivets, $\frac{3}{8}$ -in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60 and 10
Carriage bolts	60 and 10
Lag screws	60 and 10
Hot-pressed nuts, sq. blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10
Hot-pressed nuts, hex. blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10

neither dealers nor mills showing any buying activity. Plenty of railroad scrap is available, but little is coming in from the country dealers because of the low prices prevailing. Rails for rolling are 25c. a ton lower, while No. 1 railroad wrought, steel rails less than 3 ft. and steel angle bars are 50c. lower.

Railroad lists: Atchison, Topeka & Santa Fe, 4820 tons; Union Pacific, 1413 tons; Chicago, Milwaukee, St. Paul & Pacific, 46 carloads; Mobile & Ohio, 12 carloads; Nashville, Chattanooga & St. Louis, eight carloads, and St. Louis-Southwestern, five carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	\$8.50 to \$9.00
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BUFFALO

Bethlehem Steel Co. Increases Operations—10,000 Tons of Scrap Bought

BUFFALO, April 28.—Pig iron commitments in this district in the past week were the smallest in months. Not more than 3000 tons was booked. Shipping directions are good, but little new business is coming out. An Eastern company is inquiring for 500 tons of foundry iron.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	\$17.50
No. 2X fdy., sil. 2.25 to 2.75	18.00
No. 1 fdy., sil. 2.75 to 3.25	19.00
Malleable, sil. up to 2.25	18.00
Basic	17.50
Lake Superior charcoal	27.28

FINISHED STEEL

The Lackawanna plant of the Bethlehem Steel Co. has increased its open-hearth furnace operation this week to 16 units. Republic operation is three open-hearths, Wickwire-Spencer two and Gould Coupler one furnace on part time. Seneca Iron & Steel Co. is operating at about 55 per cent. In fabricated structural steel and reinforcing bars, there have been few outstanding inquiries or orders. The volume of small awards has been fair. Market buildings in Buffalo will require 300 tons of reinforcing bars. The State of New York has let another lot of small bridges.

OLD MATERIAL

The leading consumer has bought 10,000 tons of No. 1 and No. 2 heavy melting steel at \$11 and \$9.50, respectively. The order was allotted to four dealers. The sale is understood to have been made just prior to this concern's announced prices last week of \$10.50 and \$9 for these grades. An order for 2000 tons of No. 2 steel was placed by another mill at \$9.25. Dealers have been asked to bid on 20,000 tons of mixed turnings, low phosphorus scrap, hydraulic compressed sheets and machine shop turn-

No. 1 heavy melting or shoveling steel	8.25 to 8.75
No. 2 heavy melting or shoveling steel	7.75 to 8.25
No. 1 locomotive tires	10.00 to 10.50
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	9.00 to 9.50
Railroad springs	10.50 to 11.00
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	8.25 to 8.75
No. 1 busheling	6.00 to 6.50
Cast iron borings and shoveling turnings	5.50 to 6.00
Iron rails	8.00 to 8.50
Rails for rolling	10.00 to 10.50
Machine shop turnings	3.00 to 3.50
Heavy turnings	6.50 to 7.00
Steel car axles	12.50 to 13.00
Iron car axles	17.50 to 18.00
Wrot. iron bars and trans.	9.00 to 9.50
No. 1 railroad wrought	6.00 to 6.50
Steel rails, less than 3 ft.	11.00 to 11.50
Steel angle bars	8.50 to 9.00
Cast iron carwheels	8.00 to 8.50
No. 1 machinery cast	8.50 to 9.00
Railroad malleable	9.50 to 10.00
No. 1 railroad cast	8.50 to 9.00
Stove plate	7.00 to 7.50
Relay, rails, 60 lb. and under	16.00 to 16.50
Relay, rails, 70 lb. and over	20.00 to 21.00
Agricult. malleable	8.50 to 9.00

ings, which are being offered by the General Motors Corp. at Detroit, Flint and Pontiac.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	\$10.50 to \$11.00
No. 2 heavy melting scrap	9.00 to 9.50
Scrap rails	11.00 to 11.50
Hydraul. comp. sheets	9.00 to 9.50
Hand bundled sheets	8.00 to 8.50
Drop forge flashings	9.00 to 9.50
No. 1 busheling	9.00 to 9.50
Hvy. steel axle turnings	8.50 to 9.50
Machine shop turnings	5.00 to 5.50
No. 1 railroad wrought	9.00 to 9.50
Acid Open-Hearth Grades:	
Knuckles and couplers	12.50 to 13.00
Coil and leaf springs	12.50 to 13.00
Roller steel wheels	12.50 to 13.00
Low phos. billet and bloom ends	14.00 to 14.50
Electric Furnace Grades:	
Short shov. steel turnings	7.50 to 8.00
Blast Furnace Grades:	
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	6.00
Rolling Mill Grades:	
Steel car axles	15.00 to 15.50
Iron axles	16.00 to 16.50
Cupola Grades:	
No. 1 machinery cast	10.50
Stove plate	8.75 to 9.00
Locomotive grate bars	8.00 to 8.25
Steel rails, 3 ft. and under	12.00 to 12.50
Cast iron carwheels	12.50 to 13.00
Malleable Grades:	
Industrial	11.00 to 12.00
Railroad	11.00 to 12.00
Agricultural	11.00 to 12.00
Special Grades:	
Chemical borings	9.50 to 10.00

Warehouse Prices, f.o.b. Buffalo

Base per Lb.	
Plates and struc. shapes	3.25c.
Soft steel bars	3.15c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex.	3.15c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.60c.
Bands	3.50c.
Hoops	3.90c.
Blue ann'd sheets (No. 10)	3.50c.
Corn. wire nails, base per keg	\$2.60
Black wire, base per 100 lb.	3.20

CINCINNATI Pig Iron Sales Improve on Depletion of Consumers' Stocks

CINCINNATI, April 28.—Sales of pig iron in this district increased sharply last week, largely because a number of melters suddenly found supplies running short. The melt continues to be low, although local foundries have a good many prospects, which, if they materialize, will result in increased schedules. Prices on Southern Iron are holding well at \$11, base Birmingham, although there is little demand for this grade of iron. Northern prices, on the other hand, are uncertain because of the granting of concessions in the competitive areas. Included in the week's total sales of about 4200 tons was an order from a Michigan melter for 1500 tons of silvery. The only other sizable order was from a southern Ohio consumer for 1500 tons of Northern foundry iron.

Prices per gross ton, deliv'd Cincinnati:
Ala. fdy., sil. 1.75 to 2.25, \$14.19 to \$14.69
Ala. fdy., sil. 2.25 to 2.75, 14.69 to 15.19
Tenn. fdy., sil. 1.75 to 2.25, 14.19 to 14.69
S'th'n Ohio silvery, 8 per cent 24.39

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

FINISHED STEEL

Demand for sheets continued last week at better than 50 per cent of capacity. Consumers continue to purchase in anticipation of their needs for two to four weeks, but are not building up inventories. The demand is coming from virtually all the sheet consuming fields. Mill operations have been sustained at a little above 50 per cent.

OLD MATERIAL

With virtually no buying of scrap

PACIFIC COAST

SAN FRANCISCO, April 25 (By Air Mail).—Turnover in iron and steel products on the Pacific Coast continues to drag. Most of the sales and inquiries consist of small tonnages. The expected pick-up in building operations has not materialized.

Bright spots include the call for bids for a 35,000-ton welded steel pipe line and for the Golden Gate bridge across San Francisco Bay, involving close to 110,000 tons of steel products.

BARS

Demand for merchant steel bars remains quiet, and no outstanding lots have come out for figures lately. Prices continue unchanged at 2.10c., c.i.f. Movement of reinforcing steel bars is confined almost entirely to engineering projects. Only three lettings of 100 tons or over were reported. The Pacific Coast Steel Corp. secured 100 tons for the Puget Sound Navy Yard. Unnamed interests took

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
New billet reinforce. bars.....	3.15c.
Rail steel reinforce. bars.....	3.00c.
Hoops.....	3.90c.
Bands.....	3.35c.
Cold-fin. rounds and hex.....	3.80c.
Squares.....	4.30c.
Black sheets (No. 24).....	3.90c.
Galvanized sheets (No. 24).....	4.40c.
Blue ann'd sheets (No. 10).....	3.45c.
Structural rivets.....	4.20c.
Small rivets.....	.60 per cent off list
No. 9 ann'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (25 kegs or more).....	2.95
Cement c't'd nails, base 100 lb. keg.....	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in.....	\$16.50
4-in.....	34.50
Seamless steel boiler tubes, 2-in.....	17.50
4-in.....	36.00

and shipments slow, the local market has a weak undertone. Dealers' prices are unchanged, although they are largely nominal since no test of quotations has developed.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$8.75 to \$9.25
Scrap rails for melting.....	10.50 to 11.00
Loose sheet clippings.....	4.75 to 5.25
Bundled sheets.....	8.25 to 8.75
Cast iron borings.....	4.75 to 5.25
Machine shop turnings.....	5.00 to 5.50
No. 1 busheling.....	7.25 to 7.75
No. 2 busheling.....	4.25 to 4.75
Rails for rolling.....	11.50 to 12.00
No. 1 locomotive tires.....	10.00 to 10.50
No. 2 railroad wrought.....	8.75 to 9.25
Short rails.....	13.75 to 14.25
Cast iron carwheels.....	10.50 to 11.00
No. 1 machinery cast.....	13.00 to 13.50
No. 1 railroad cast.....	11.50 to 12.00
Burnt cast.....	6.50 to 7.00
Stove plate.....	6.50 to 7.00
Brake shoes.....	6.50 to 7.00
Agricultural malleable.....	11.00 to 11.50
Railroad malleable.....	12.00 to 12.50

Steel Business Continues to Drag—Building Operations Not Gaining

Pig iron prices per gross ton at San Francisco:

*Utah basic.....	\$22.00 to \$24.00
*Utah fdy., sil. 2.75 to 3.25.....	22.00 to 24.00
**Indian fdy., sil. 2.75 to 3.25.....	22.00 to 24.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

100 tons for an open-air theater in Los Angeles and 254 tons for paving work in San Mateo County, Cal. Bids will be opened next week on 4000 tons for the Sixth Street bridge, Los Angeles. New inquiries include 255

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes.....	2.50c.
Soft steel bars.....	2.50c.
Black sheets (No. 24).....	4.15c.
Blue ann'd sheets (No. 10).....	3.05c.
Galv. sheets (No. 24).....	4.65c.
Struc. rivets, 1/2-in. and larger.....	5.00c.
Com. wire nails, base per keg.....	\$3.35
Cement c't'd nails, 100 lb. keg.....	3.35

tons for the Hetch Hetchy pipe line and 112 tons for a bridge over the Santa Ana River, Cal. San Francisco out-of-stock prices remain unchanged at 2.60c., base, on carload lots, while Los Angeles quotations are firm at 2.50c., base.

PLATES

The Western Pipe & Steel Co. booked 585 tons of 40-in., 3/8-in. plate, welded steel pipe for Los Angeles, and the Montague Pipe & Steel Co. took 200 tons for a 30-in. welded steel pipe line for the Honolulu Iron Works, Honolulu. Bids will be opened May 6 on 35,000 tons of 60-in. welded steel pipe for the Hetch Hetchy project. The Western Pipe & Steel Co. was low bidder on 840 tons of welded steel pipe for San Francisco. Seattle will open bids May 1 on 110 tons for two steel standpipes. Prices continue to range from 2c. to 2.05c., c.i.f.

SHAPES

Bids will be opened June 17 on the largest structural project ever to come up for figures on the Pacific Coast. This involves 75,000 tons of shapes and 28,000 tons of cable for the Golden Gate bridge. Awards included 525 tons for an overhead crossing over the Santa Fe tracks near Merced, Cal., placed with the Pacific Coast Engineering Co., and 500 tons for Pier No. 15, San Francisco, booked by the Moore Drydock Co. Oakland, Cal., will open bids April 27 on 175 tons for a warehouse. Plain material ranges from 2.05c. to 2.15c., c.i.f.

CAST IRON PIPE

Inquiries are confined to lots of less than 100 tons. The American Cast Iron Pipe Co. took 175 tons of 6-in. Class 150 pipe for Fort Lewis and Camp Murray, Wash. The United States Pipe & Foundry Co. booked 100 tons of 10-in. Class 150 pipe for Lynden, Wash.

SHEETS

Movement remains light. Stocks in consumers' warehouses are sufficient to take care of immediate requirements. Blue annealed, No. 10 gage, holds at 2.50c., c.i.f. Black sheets, No. 24 gage, and galvanized sheets, No. 24 gage, are quoted at 3c. and 3.50c., c.i.f., respectively.

The Gray Iron Institute will hold a luncheon at the Stevens Hotel, Chicago, May 6, during the American Foundrymen's Association convention. Executives of non-member companies are invited. The Chicago district chapter of the institute will act as host at this luncheon. Meetings of the cost, membership and technical committees of the institute will be held May 6 and of the finance and budget committees and board of directors May 7.

Canada

Pig Iron and Scrap Orders Not Gaining

TORONTO, April 28.—Pig iron sales, while holding well up to records of previous weeks, are not developing increased volume. Future delivery buying is at a standstill, and current business is confined to small spot orders. Prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$22.60
No. 2 fdy., sil. 1.75 to 2.25.....	22.10
Malleable.....	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$24.00
No. 2 fdy., sil. 1.75 to 2.25.....	23.50
Malleable.....	24.00
Basic.....	20.50

OLD MATERIAL

The scrap markets have developed nothing in the way of increased business, but are pegging along under slow buying by consumers, the majority of whom are placing orders for special grades. Steel scrap is in somewhat better demand than it was a month or six weeks ago, but current calls are for small tonnages with limited total volume. Dealers report a steady flow of orders from foundries for machinery cast. Price lists are unchanged. Dealers' yards are overstocked.

Dealers' buying prices for old material: Per Gross Ton

	Toronto	Montreal
Heavy melting steel.....	\$7.00	\$6.00
Rails, scrap.....	7.00	6.00
No. 1 wrought.....	6.00	8.00
Machine shop turnings.....	2.00	2.00
Boiler plate.....	5.00	4.50
Heavy axle turnings.....	2.50	2.50
Cast borings.....	2.00	2.00
Steel borings.....	2.00	2.00
Wrought pipe.....	2.00	2.00
Steel axles.....	7.00	9.00
Axles, wrought iron.....	7.00	11.00
No. 1 machinery cast.....	10.00	10.00
Stove plate.....	8.00	8.00
Standard carwheels.....	8.50	8.50
Malleable.....	8.00	8.00
Per Net Ton		
No. 1 mach'y cast.....	11.00	.....
Stove plate.....	9.00	.....
Standard carwheels.....	10.00	.....
Malleable scrap.....	9.00	.....

Cleveland Iron and Steel Market

(Concluded from page 1483)

shapes and plates, 1.65c., Pittsburgh, is generally regarded as the market, although a little small-lot business has been taken at 1.70c.

OLD MATERIAL

A Cleveland plant that has been taking no scrap recently has issued limited releases for steel-making grades. The market is weak. Blast furnace scrap has declined 25c. a ton and machine shop turnings 50c. a ton. There is no local market for the latter, which is bringing only about \$3.75, Cleveland, for Valley shipment. No. 1 heavy melting steel is quoted at

\$11.50 to \$12 for delivery to Valley mills, and dealers have bought small lots for Valley delivery at \$11.25.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel...	\$9.75 to \$10.25
No. 2 heavy melting steel...	9.50 to 9.75
Compressed sheet steel...	8.50 to 9.00
Light bundled sheet stampings.....	7.00 to 7.50
Drop forge flashings.....	7.50 to 8.00
Machine shop turnings.....	4.00 to 4.50
Short shoveling turnings.....	6.75 to 7.00
No. 1 railroad wrought.....	9.50 to 10.00
No. 2 railroad wrought.....	10.00 to 10.50
No. 1 busheling.....	8.00 to 8.50
Pipes and flues.....	5.50 to 6.00
Steel axle turnings.....	8.00 to 8.50
Acid Open-Hearth Grades:	
Low phos., billet bloom and slab crops.....	14.00 to 14.50
Blast Furnace Grades:	
Cast iron borings.....	6.25 to 6.75
Mixed borings and short turnings.....	6.25 to 6.75
No. 2 busheling.....	6.00 to 6.50
Cupola Grades:	
No. 1 cast.....	12.00 to 12.50
Railroad grate bars.....	6.00 to 6.50
Stove plate.....	6.00 to 6.50
Rails under 3 ft.....	15.00 to 15.50
Miscellaneous:	
Rails for rolling.....	13.00 to 13.50
Railroad malleable.....	12.00 to 12.50

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Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel.....	\$8.50 to \$9.00
Borings and short turnings.....	3.50 to 4.00
Long turnings.....	2.75 to 3.25
No. 1 machinery cast.....	9.00 to 9.50
Automotive cast.....	11.00 to 11.50
Hydral, comp. sheets.....	7.75 to 8.25
Stove plate.....	6.50 to 6.75
New No. 1 busheling.....	6.50 to 7.00
Old No. 2 busheling.....	2.50 to 3.00
Sheet clippings.....	5.25 to 5.50
Flashings.....	7.25 to 7.75

E. Arthur Tutein, Inc., in Bankruptcy Action

A petition in bankruptcy has been filed by E. Arthur Tutein, Inc., in the Federal District Court at Boston. The Tutein firm, now out of active business, was formerly the pig iron and coke sales agent for the Hudson Valley Coke & Products Co., Troy, N. Y., and won a verdict against that company in an arbitration proceedings for violation of contract. The award was made some months ago. Liabilities of the firm are listed at \$444,000 and assets at \$205,000.

International Derrick, Stacey Engineering Merge

The International Stacey Corp'n. has been formed by a merger of the International Derrick & Equipment Co. and the Stacey Engineering Co.

The International Derrick & Equipment Co. is one of the largest manufacturers of oil well equipment, towers and derricks, transmission power line and railroad equipment. It operates plants at Columbus and Delaware, Ohio; Beaumont, Tex., and Los Angeles, Cal., and has about 30 distributing warehouses. Stacey Engineering Co. is the owner and operator of the Stacey Brothers Gas Construction Co. and is largely interested in the Stacey Mfg. Co., both of Cincinnati, and owns and operates the Connersville Blower Co. and the P. H. & F. M. Roots Co. of Connersville, Ind., and the Wilbraham-Green Blower Co. at Pottstown, Pa.

The Stacey companies have for nearly 80 years been engaged in the construction of gas holders, tanks, stacks, purifiers and other gas, oil and water-containing equipment. The two companies at Connersville, Ind., and the one at Pottstown, Pa., are manufacturers of blowers, pumps, exhausters, meters and similar equipment.

Executive offices of the new company will be consolidated at Columbus, Ohio. Col. Carmi A. Thompson of Cleveland, now president of the Stacey Engineering Co., is said to be slated for chairman of the board and Harry M. Runkle, president of the International Derrick & Equipment Co., will be president and general manager of the new company and in direct charge of all operations. Mr. Runkle is a director of the American Rolling Mill Co., Middletown, Ohio.

Bethlehem May Acquire Fabricators This Week

Negotiations which have been in progress for some time for the acquisition of the Hay Foundry & Iron Works, the Levering & Garrigues Co. and the Hedden Iron Construction Co. by the Bethlehem Steel Corp'n. are said to have reached a successful conclusion, and action looking to the formal acquisition of these companies will come before the Bethlehem board of directors on Thursday of this week.

The Hay, Levering & Garrigues, and the Hedden companies own and operate structural steel fabricating plants in the New York metropolitan area and have a total fabricating capacity of about 125,000 to 150,000 tons a year. With the acquisition of these companies, together with the Eastern plants of the McClintic-Marshall Corp'n., which Bethlehem recently acquired, the Bethlehem company will be in a position to fabricate about 40 per cent of the structural steel used in the New York district.

CINCINNATI Pig Iron Sales Improve on Depletion of Consumers' Stocks

CINCINNATI, April 28.—Sales of pig iron in this district increased sharply last week, largely because a number of melters suddenly found supplies running short. The melt continues to be low, although local foundries have a good many prospects, which, if they materialize, will result in increased schedules. Prices on Southern Iron are holding well at \$11, base Birmingham, although there is little demand for this grade of iron. Northern prices, on the other hand, are uncertain because of the granting of concessions in the competitive areas. Included in the week's total sales of about 4200 tons was an order from a Michigan melter for 1500 tons of silvery. The only other sizable order was from a southern Ohio consumer for 1500 tons of Northern foundry iron.

Prices per gross ton, deliv'd Cincinnati:
Ala. fdy., sil. 1.75 to 2.25... \$14.19 to \$14.69
Ala. fdy., sil. 2.25 to 2.75... 14.69 to 15.19
Tenn. fdy., sil. 1.75 to 2.25... 14.19 to 14.69
S'th'n Ohio silvery, 8 per cent 24.39

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

FINISHED STEEL

Demand for sheets continued last week at better than 50 per cent of capacity. Consumers continue to purchase in anticipation of their needs for two to four weeks, but are not building up inventories. The demand is coming from virtually all the sheet consuming fields. Mill operations have been sustained at a little above 50 per cent.

OLD MATERIAL

With virtually no buying of scrap

PACIFIC COAST

SAN FRANCISCO, April 25 (*By Air Mail*).—Turnover in iron and steel products on the Pacific Coast continues to drag. Most of the sales and inquiries consist of small tonnages. The expected pick-up in building operations has not materialized.

Bright spots include the call for bids for a 35,000-ton welded steel pipe line and for the Golden Gate bridge across San Francisco Bay, involving close to 110,000 tons of steel products.

BARS

Demand for merchant steel bars remains quiet, and no outstanding lots have come out for figures lately. Prices continue unchanged at 2.10c., c.i.f. Movement of reinforcing steel bars is confined almost entirely to engineering projects. Only three lettings of 100 tons or over were reported. The Pacific Coast Steel Corp. secured 100 tons for the Puget Sound Navy Yard. Unnamed interests took

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
New billet reinf. bars.....	3.15c.
Rail steel reinf. bars.....	3.00c.
Hoops.....	3.90c.
Bands.....	3.35c.
Cold-fin. rounds and hex.....	3.80c.
Squares.....	4.30c.
Black sheets (No. 24).....	3.90c.
Galvanized sheets (No. 24).....	4.40c.
Blue ann'd sheets (No. 10).....	3.45c.
Structural rivets.....	4.20c.
Small rivets.....	60 per cent off list
No. 9 ann'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (25 kegs or more).....	2.95
Cement c't'd nails, base 100 lb. keg.....	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in.....	\$16.50
4-in.....	34.50
Seamless steel boiler tubes, 2-in.....	17.50
4-in.....	36.00

and shipments slow, the local market has a weak undertone. Dealers' prices are unchanged, although they are largely nominal since no test of quotations has developed.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$8.75 to \$9.25
Scrap rails for melting.....	10.50 to 11.00
Loose sheet clippings.....	4.75 to 5.25
Bundled sheets.....	8.25 to 8.75
Cast iron borings.....	4.75 to 5.25
Machine shop turnings.....	5.00 to 5.50
No. 1 busheling.....	7.25 to 7.75
No. 2 busheling.....	4.25 to 4.75
Rails for rolling.....	11.50 to 12.00
No. 1 locomotive tires.....	10.00 to 10.50
No. 2 railroad wrought.....	8.75 to 9.25
Short rails.....	13.75 to 14.25
Cast iron carwheels.....	10.50 to 11.00
No. 1 machinery cast.....	13.00 to 13.50
No. 1 railroad cast.....	11.50 to 12.00
Burnt cast.....	6.50 to 7.00
Stove plate.....	6.50 to 7.00
Brake shoes.....	6.50 to 7.00
Agricultural malleable.....	11.00 to 11.50
Railroad malleable.....	12.00 to 12.50

Steel Business Continues to Drag—Building Operations Not Gaining

Pig iron prices per gross ton at San Francisco:

*Utah basic.....	\$22.00 to \$24.00
*Utah fdy., sil. 2.75 to 3.25.....	22.00 to 24.00
**Indian fdy., sil. 2.75 to 3.25.....	22.00 to 24.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

100 tons for an open-air theater in Los Angeles and 254 tons for paving work in San Mateo County, Cal. Bids will be opened next week on 4000 tons for the Sixth Street bridge, Los Angeles. New inquiries include 255

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes.....	2.50c.
Soft steel bars.....	2.50c.
Black sheets (No. 24).....	4.15c.
Blue ann'd sheets (No. 10).....	3.05c.
Galv. sheets (No. 24).....	4.65c.
Struc. rivets, 1/2-in. and larger.....	5.00c.
Com. wire nails, base per keg.....	\$3.35
Cement c't'd nails, 100 lb. keg.....	3.35

tons for the Hetch Hetchy pipe line and 112 tons for a bridge over the Santa Ana River, Cal. San Francisco out-of-stock prices remain unchanged at 2.60c., base, on carload lots, while Los Angeles quotations are firm at 2.50c., base.

PLATES

The Western Pipe & Steel Co. booked 585 tons of 40-in., 3/8-in. plate, welded steel pipe for Los Angeles, and the Montague Pipe & Steel Co. took 200 tons for a 30-in. welded steel pipe line for the Honolulu Iron Works, Honolulu. Bids will be opened May 6 on 35,000 tons of 60-in. welded steel pipe for the Hetch Hetchy project. The Western Pipe & Steel Co. was low bidder on 840 tons of welded steel pipe for San Francisco. Seattle will open bids May 1 on 110 tons for two steel standpipes. Prices continue to range from 2c. to 2.05c., c.i.f.

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SHEETS

Movement remains light. Stocks in consumers' warehouses are sufficient to take care of immediate requirements. Blue annealed, No. 10 gage, holds at 2.50c., c.i.f. Black sheets, No. 24 gage, and galvanized sheets, No. 24 gage, are quoted at 3c. and 3.50c., c.i.f., respectively.

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Prices per gross ton:

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No. 1 fdy., sil. 2.25 to 2.75.....	\$22.60
No. 2 fdy., sil. 1.75 to 2.25.....	22.10
Malleable.....	22.60
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No. 1 fdy., sil. 2.25 to 2.75.....	\$24.00
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Malleable.....	24.00
Basic.....	20.50

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Dealers' buying prices for old material:
Per Gross Ton

	Toronto	Montreal
Heavy melting steel.....	\$7.00	\$6.00
Rails, scrap.....	7.00	6.00
No. 1 wrought.....	6.00	8.00
Machine shop turnings.....	2.00	2.00
Boiler plate.....	5.00	4.50
Heavy axle turnings.....	2.50	2.50
Cast borings.....	2.00	2.00
Steel borings.....	2.00	2.00
Wrought pipe.....	2.00	2.00
Steel axles.....	7.00	9.00
Axles, wrought iron.....	7.00	11.00
No. 1 machinery cast.....	10.00	10.00
Stove plate.....	8.00	8.00
Standard carwheels.....	8.50	8.50
Malleable.....	8.00	8.00
Per Net Ton		
No. 1 mach'y cast.....	11.00	.....
Stove plate.....	9.00	.....
Standard carwheels.....	10.00	.....
Malleable scrap.....	9.00

Cleveland Iron and Steel Market

(Concluded from page 1483)

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\$11.50 to \$12 for delivery to Valley mills, and dealers have bought small lots for Valley delivery at \$11.25.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel...	\$9.75 to \$10.25
No. 2 heavy melting steel...	9.50 to 9.75
Compressed sheet steel...	8.50 to 9.00
Light bundled sheet stampings.....	7.00 to 7.50
Drop forge flashings.....	7.50 to 8.00
Machine shop turnings.....	4.00 to 4.50
Short shoveling turnings.....	6.75 to 7.00
No. 1 railroad wrought...	9.50 to 10.00
No. 2 railroad wrought...	10.00 to 10.50
No. 1 busheling.....	8.00 to 8.50
Pipes and flues.....	5.50 to 6.00
Steel axle turnings.....	8.00 to 8.50

Acid Open-Hearth Grades:	
Low phos., billet bloom and slab crops.....	14.00 to 14.50

Blast Furnace Grades:	
Cast iron borings.....	6.25 to 6.75
Mixed borings and short turnings.....	6.25 to 6.75
No. 2 busheling.....	6.00 to 6.50

Cupola Grades:	
No. 1 cast.....	12.00 to 12.50
Railroad grate bars.....	6.00 to 6.50
Stove plate.....	6.00 to 6.50
Rails under 3 ft.....	15.00 to 15.50

Miscellaneous:	
Rails for rolling.....	13.00 to 13.50
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Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel.....	\$8.50 to \$9.00
Borings and short turnings.....	3.50 to 4.00
Long turnings.....	2.75 to 3.25
No. 1 machinery cast.....	9.00 to 9.50
Automotive cast.....	11.00 to 11.50
Hydral. comp. sheets.....	7.75 to 8.25
Stove plate.....	6.50 to 6.75
New No. 1 busheling.....	6.50 to 7.00
Old No. 2 busheling.....	2.50 to 3.00
Sheet clippings.....	5.25 to 5.50
Flashings.....	7.25 to 7.75

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▲▲ Semi-Finished Steel, Raw Materials, Bolts and Rivets ▲▲

MILL PRICES OF SEMI-FINISHED STEEL

Billets and Blooms	
	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	\$30.00
Rerolling, 4-in. and under 10-in., Youngstown	30.00
Rerolling, 4-in. and under 10-in., Cleveland	30.00
Rerolling, 4-in. and under 10-in., Chicago	31.00 to 32.00
Forging quality, Pittsburgh	36.00

Sheet Bars (Open-Hearth or Bessemer)	
	Per Gross Ton
Pittsburgh	\$30.00
Youngstown	30.00
Cleveland	30.00

Slabs (8 in. x 2 in. and under 10 in. x 10 in.)	
	Per Gross Ton
Pittsburgh	\$30.00
Youngstown	30.00
Cleveland	30.00

Skelp (F.o.b. Pittsburgh or Youngstown)	
	Per Lb.
Grooved	1.65c.
Universal	1.65c.
Sheared	1.65c.

Wire Rods (Common soft, base)	
	Per Gross Ton
Pittsburgh	\$35.00 to \$37.00
Cleveland	35.00 to 37.00
Chicago	35.00 to 37.00

PRICES OF RAW MATERIAL

Ores	
Lake Superior Ores, Delivered Lower Lake Ports	
	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore	
	Per Unit
Iron ore low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	8c. to 9c.
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic or foundry, Swedish, average 65% iron	9.00c.
Manganese ore, washed 52% manganese, from the Caucasus	25c. to 27c.
Manganese ore, African or Indian, 50 to 52%	24c. to 26c.
Manganese ore, Brazilian, 46 to 48%	22c. to 24c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$12.00 to \$12.50
Per Gross Ton	
Chrome ore, 45% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	\$20.00
Chrome ore, 48% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	22.50

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.50
Foundry, f.o.b. Connellsville prompt	3.25 to 4.75
Foundry, by-products, Ch'go ovens	8.00
Foundry, by-products, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-products, St. Louis, f.o.b. ovens	8.00
Foundry, by-prod., del'd St. Louis	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.40 to \$1.50
Mine run coking coal, f.o.b. W. Pa. mines	1.40 to 1.50
Gas coal, 3/4-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	75c. to 85c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese	
	Per Gross Ton
Domestic 80% seaboard	*\$80.00 to \$85.00
Foreign, 80% Atlantic or Gulf port, duty paid	*80.00 to 85.00

*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 19 to 21%	\$28.00 to \$30.00

Electric Ferrosilicon	
	Per Gross Ton Delivered
50%	\$83.50
75%	130.00
Per Gross Ton Furnace	
10%	\$35.00
11%	37.00
12%	12%
14 to 16%	\$39.00

Bessemer Ferrosilicon	
F.o.b. Jackson County, Ohio, Furnace	
	Per Gross Ton
10%	\$25.00
11%	26.00
12%	27.00
13%	\$29.00
14%	31.00
15%	33.00

Silvery Iron	
F.o.b. Jackson County, Ohio, Furnace	
	Per Gross Ton
6%	\$21.00
7%	21.50
8%	22.00
9%	22.50
10%	23.00
11%	\$24.00
12%	25.00
13%	26.00
14%	27.00
15%	28.00
16%	\$31.00

Other Ferroalloys	
Ferrotungsten, per lb. contained metal	\$1.08
del'd, carloads	\$1.15 to 1.25
Ferrotungsten, less carloads	1.15 to 1.25
Ferrocromium 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrocromium, 2% carbon	17.00c. to 17.50c.
Ferrocromium, 1% carbon	19.00c. to 20.00c.
Ferrocromium, 0.10% carbon	24.50c. to 26.00c.
Ferrocromium, 0.06% carbon	26.50c. to 28.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocobaltititanium 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	122.50
Silico-manganese, gross ton, delivered	135.00

Delivered prices at Chicago are about 50c. a ton below this schedule.

Fluxes and Refractories

Fluorspar	
	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$14.00
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick	
Per 1000 f.o.b. Works	
	High-Heat Intermediate
	Duty Brick Heavy Duty Brick
Pennsylvania	\$40.00 to \$43.00 \$32.00 to \$35.00
Maryland	40.00 to 43.00 32.00 to 35.00
New Jersey	40.00 to 43.00 32.00 to 35.00
Ohio	40.00 to 43.00 32.00 to 35.00
Kentucky	40.00 to 43.00 32.00 to 35.00
Missouri	40.00 to 43.00 32.00 to 35.00
Illinois	40.00 to 43.00 32.00 to 35.00
Ground fire clay, per ton	6.50

Silica Brick	
Per 1000 f.o.b. Works	
Pennsylvania	\$45.00
Chicago	49.00
Birmingham	47.00
Silica clay, per ton	8.00

Magnesite Brick	
	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick	
	Per Net Ton
Standard size	\$45.00

MILL PRICES OF BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts	
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	
	Per Cent Off List
Machine bolts	73
Carriage bolts	73
Lag bolts	73
Plow bolts, Nos. 1, 2, 3 and 7 heads	73
Hot-pressed nuts, blank or tapped, square	73
Hot-pressed nuts, blank or tapped, hexagons	73
C.p.c. and t. square or hex. nuts, blank or tapped	73
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
*Bolts with rolled thread up to and including 3/4 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts	
	Per Cent Off List
Semi-finished hexagons nuts	73
Semi-finished hexagons castellated nuts, S.A.E.	73
Stove bolts in packages, P'rh.	80, 10, 10 and 5
Stove bolts in packages, Chicago	80, 10, 10 and 5
Stove bolts in packages, Cleveland	80, 10, 10 and 5
Stove bolts in bulk, P'rh.	80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Chicago	80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Cleveland	80, 10, 10, 5 and 2 1/2
Tire bolts	60, 10 and 10

Discounts of 73 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets (1/2-in. and larger)	
	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	\$2.75
F.o.b. Chicago	2.85

Small Rivets (3/16-in. and smaller)	
	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws	
(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	
	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread	85 and 10
Upset hex. cap screws, S.A.E. thread	80, 10 and 5
Upset set screws	80, 10 and 5
Milled studs	70

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c. to 1.70c.
F.o.b. Chicago.....	1.75c. to 1.80c.
Del'd Philadelphia.....	1.94c. to 1.99c.
Del'd New York.....	1.98c. to 2.03c.
F.o.b. Cleveland.....	1.65c. to 1.70c.
F.o.b. Lackawanna.....	1.75c. to 1.80c.
F.o.b. Birmingham.....	1.80c.
C.i.f. Pacific ports.....	2.25c.
F.o.b. San Francisco mills.....	2.25c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.....	1.65c. to 1.90c.
F.o.b. Birmingham, mill lengths.....	1.75c. to 1.80c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.50c. to 1.55c.
F.o.b. Chicago Heights mill.....	1.60c. to 1.65c.
Del'd Philadelphia.....	1.84c. to 1.89c.

Iron

Common iron, f.o.b. Chicago.....	1.75c. to 1.80c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron del'd Philadelphia.....	2.09c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c. to 1.70c.
F.o.b. Chicago.....	1.75c. to 1.80c.
F.o.b. Birmingham.....	1.80c.
Del'd Cleveland.....	1.83 1/4c.
Del'd Philadelphia.....	1.85 1/4c.
F.o.b. Coatesville.....	1.75c. to 1.80c.
F.o.b. Sparrows Point.....	1.75c. to 1.80c.
F.o.b. Lackawanna.....	1.75c. to 1.80c.
Del'd New York.....	1.93c. to 1.98c.
C.i.f. Pacific ports.....	2.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c. to 1.70c.
F.o.b. Chicago.....	1.75c. to 1.80c.
F.o.b. Birmingham.....	1.80c.
F.o.b. Lackawanna.....	1.75c. to 1.80c.
F.o.b. Bethlehem.....	1.75c. to 1.80c.
Del'd Cleveland.....	1.83 1/4c.
Del'd Philadelphia.....	1.76c.
Del'd New York.....	1.90 1/2c. to 1.95 1/2c.
C.i.f. Pacific ports.....	2.15c. to 2.25c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	1.60c. to 1.65c.
Wider than 6 in., P'gh.....	1.50c. to 1.55c.
6 in. and narrower, Chicago.....	1.75c. to 1.80c.
Wider than 6 in., Chicago.....	1.65c. to 1.70c.
Cooperage stock, P'gh.....	1.80c. to 1.90c.
Cooperage stock, Chicago.....	1.80c. to 1.90c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.10c.
Bars, f.o.b. Chicago.....	2.10c.
Bars, Cleveland.....	2.10c.
Bars, Buffalo.....	2.10c.
Shafting, ground, f.o.b. mill.....	2.45c. to 3.40c.
Strips, P'gh.....	2.15c. to 2.25c.
Strips, Cleveland.....	2.15c. to 2.25c.
Strips, deliv'd Chicago.....	2.43c. to 2.53c.
Strips, Worcester.....	2.30c. to 2.40c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	3.20c.

*According to size.

Wire Products

	Base per Lb.
(Carload lots, f.o.b. Pittsburgh and Cleveland)	
To Manufacturing Trade	
Bright wire.....	2.20c. to 2.30c.
Spring wire.....	3.20c. to 3.30c.
To Jobbing Trade	

	Base per Lb.
Smooth annealed wire.....	2.35c. to 2.45c.
Smooth galvanized wire.....	2.80c. to 2.90c.
Polished staples.....	2.35c. to 2.45c.
Galvanized staples.....	2.60c. to 2.70c.
Barbed wire, galvanized.....	2.55c. to 2.65c.
Woven wire fence, per net ton.....	\$60.00

	Base per Keg
Standard wire nails.....	\$1.90 to \$2.00
Smooth coated nails.....	1.90 to 2.00
Galvanized nails.....	3.90 to 4.00

To Retail Trade

	Base per Lb.
Bright wire.....	2.30c. to 2.40c.
Smooth annealed wire.....	2.40c. to 2.50c.
Smooth galvanized wire.....	2.90c. to 3.00c.

	Base per Keg
Standard wire nails.....	\$2.00 to \$2.10
Cement coated nails.....	2.00 to 2.10
Galvanized nails.....	4.00 to 4.10

	Base per Lb.
Polished staples.....	2.45c. to 2.55c.
Galvanized staples.....	2.70c. to 2.80c.
Barbed wire galvanized.....	2.65c. to 2.75c.
Woven wire fence per net ton.....	\$65.00

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Light Plates Base per Lb.

No. 10, blue annealed, f.o.b. P'gh.....	1.85c.
No. 10, blue annealed, f.o.b. Chicago dist.....	1.95c. to 2.00c.
No. 10, blue an'd, del'd Phila.....	2.14c. to 2.19c.
No. 10, blue annealed, B'ham.....	2.00c. to 2.05c.
No. 10, blue annealed, Pacific Coast ports.....	2.50c.

Sheets

	Blue Annealed Base per Lb.
No. 13, f.o.b. P'gh.....	2.00c.
No. 13, f.o.b. Chicago dist.....	2.10c.
No. 13, del'd Philadelphia.....	2.29c.
No. 13, blue annealed, B'ham.....	2.15c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.25c.
No. 24, f.o.b. Chicago dist. mill.....	2.35c.
No. 24, del'd Philadelphia.....	2.44c. to 2.54c.
No. 24, f.o.b. Birmingham.....	2.40c. to 2.50c.
No. 24, c.i.f. Pacific Coast ports.....	3.00c.

Steel Furniture Sheets

No. 24, f.o.b. P'gh.....	3.50c.
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Galvanized

No. 24, f.o.b. Pittsburgh.....	2.80c. to 2.85c.
No. 24, f.o.b. Chicago dist. mill.....	2.90c. to 2.95c.
No. 24, del'd Cleveland.....	2.98 1/2c. to 3.03 1/2c.
No. 24, del'd Philadelphia.....	3.24c.
No. 24, f.o.b. Birmingham.....	2.80c. to 2.90c.
No. 24, c.i.f. Pacific Coast ports.....	3.50c.

Continuous Mill Sheets

No. 10 gage.....	1.70c.
No. 13 gage.....	1.85c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.55c. to 2.65c.
No. 28, f.o.b. Chicago dist. mill.....	2.65c. to 2.75c.

Automobile Body Sheets

No. 24, f.o.b. Pittsburgh.....	3.10c.
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Long Terns

No. 24, 8-lb. coating, f.o.b. mill:	
Unassorted.....	3.15c.
Seconds.....	2.75c.
Primes only.....	3.25c.

Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh.....	3.70c.
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Tin Plate Base per Box

Standard cokes, f.o.b. P'gh district mills.....	\$5.00
Standard cokes, f.o.b. Gary.....	5.10

Terne Plate

(F.o.b. Morgantown or Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$10.30	25-lb. coating I.C. \$15.20
15-lb. coating I.C. 12.90	30-lb. coating I.C. 16.00
20-lb. coating I.C. 14.00	40-lb. coating I.C. 17.80

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.

S.A.E. Series	Alloy	Differential
2000 (1 1/4% Nickel)		\$0.25
2100 (1 1/4% Nickel)		0.55
2300 (3 1/4% Nickel)		1.50
2500 5% Nickel		2.25
3100 Nickel Chromium		0.55
3200 Nickel Chromium		1.35
3300 Nickel Chromium		3.50
3400 Nickel Chromium		3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)		0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)		0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)		1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)		0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)		0.45
5100 Chromium Spring Steel		0.20
6100 Chromium Vanadium Bar		1.20
6100 Chromium Vanadium Spring Steel		0.95
9250 Silicon Manganese Spring Steel (flats)		0.25
Rounds and squares		0.50
Chromium Nickel Vanadium		1.50
Carbon Vanadium		0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	34.00
Light (from rail steel), f.o.b. mill.....	32.00
Light (from billets), f.o.b. Chgo mill.....	36.00

Track Equipment

	Base per 100 Lb.
Spikes, 3/4 in. and larger.....	\$2.70
Spikes, 1/2 in. and larger.....	2.70

Spikes, boat and barge.....	\$2.90
Tie plate, steel.....	1.95
Angle bars.....	2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	.73 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Steel		Butt Weld		Iron	
Inches	Black Galv.			Inches	Black Galv.
1/8	47	21 1/2		1/4 and 3/8	+11 +36
1/4 to 3/8	53	27 1/2		1/2	23 5
1/2	58	44 1/2		3/4	28 11
3/4	62	50 1/2		1 and 1 1/4	31 15
1 to 3	64	52 1/2		1 1/2 and 2	35 18

Lap Weld

2	57	45 1/2	2	23	9
2 1/2 to 6	61	49 1/2	2 1/2 to 3 1/2	28	13
7 and 8	58	45 1/2	4 to 6	30	17
9 and 10	56	43 1/2	7 and 8	29	16
11 and 12	55	42 1/2	9 to 12	26	11

Butt Weld, extra strong, plain ends

1 $\frac{1}{2}$	43	26 $\frac{1}{2}$	1 $\frac{1}{2}$ and 3 $\frac{3}{4}$..	+13	+48
1 $\frac{1}{4}$ to 3 $\frac{3}{8}$..	49	32 $\frac{1}{2}$	1 $\frac{1}{2}$	23	7
1 $\frac{1}{2}$	55	44 $\frac{1}{2}$	3 $\frac{3}{4}$	28	12
3 $\frac{3}{4}$	60	49 $\frac{1}{2}$	1 to 2	34	18

Lap Weld, extra strong, plain ends

2	55	44 1/2	2	29	13
2 1/2 to 4	59	48 1/2	2 1/2 to 4	34	20
4 1/2 to 6	58	47 1/2	4 1/2 to 6	33	19
7 to 8	54	41 1/2	7 and 8	31	17
9 and 10	47	34 1/2	9 to 12	21	8
11 and 12	46	33 1/2			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1 1/2 points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2 1/2%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2 1/4 in. 38	1 1/2 in. 1
2 1/2 in.—2 3/4 in. 46	1 3/4 in. 8
3 in. 52	2 in.—2 1/2 in. 13
3 1/4 in.—3 3/4 in. 54	2 1/2 in.—2 3/4 in. 16
4 in. 57	3 in. 17
4 1/2 in. to 6 in. 46	3 1/4 in. to 3 1/2 in. 18
	4 in. 20
	4 1/2 in. 21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts: Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn	Hot Rolled
1 in. 61	3 in. 46
1 1/4 to 1 1/2 in. 53	3 1/4 to 3 1/2 in. 48
1 3/4 in. 37	4 in. 51
2 to 2 1/4 in. 32	4 1/2, 5 and 6 in. 40
2 1/2 to 2 3/4 in. 40	

2 and 2 1/4 in. 38	3 1/4 to 3 1/2 in. 54
2 1/2 and 2 3/4 in. 46	4 in. 57
3 in. 52	4 1/2, 5 and 6 in. 46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)....	55
Carbon, 0.30% to 0.40% base.....	50
Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

FABRICATED STRUCTURAL STEEL

**New Projects Total 103,000 Tons and Include Golden Gate Bridge
—Awards Only 13,000 Tons**

NEW fabricated structural steel projects this week total about 103,000 tons, of which 75,000 tons is contributed by the Golden Gate Bridge in San Francisco, bids to be opened June 17. This compares with 49,000 tons of new projects a week ago and 55,000 tons two weeks ago. The only other sizeable new construction in this week's total is 5300 tons for a section of subway on Sixth Avenue, New York, and a 4000-ton viaduct in Chicago.

In the first four months of this year, THE IRON AGE has reported a total of 1,118,000 tons of new structural steel projects, 113 per cent more than the 525,000 tons reported in four months of 1930 and 76 per cent more than the 636,000 tons in the same period of 1929.

Awards of fabricated steel this week are only about 13,000 tons, the smallest total since the end of January. All the important tonnages placed are for bridge construction, including 2000 tons for a highway bridge at Boston, Pa., 1500 tons for the Klinge Valley bridge in Washington, and 1100 tons for a bridge over the Black River at Jonesville, La. Awards follow:

North Atlantic States

STATE OF NEW YORK, 175 tons, highway bridge, to American Bridge Co.
NEW YORK, 200 tons, tunnel arch supports, to American Bridge Co.
NEW YORK, 300 tons, beams for route 119, section 5, to McClintic-Marshall Corp.
BRENTWOOD, N. Y., 1020 tons, Pilgrim State Hospital, to McClintic-Marshall Corp.; previously reported to E. Schlaet & Son.
BUFFALO, 165 tons, bridge for Erie Railroad, to American Car & Foundry Co.
BUFFALO, 300 tons, Fire Department headquarters, to R. S. McManus Steel Construction Co.
RETREAT, PA., 350 tons, service building in Central Poor District, to Bethlehem Construction Co.
BOSTON, PA., 2000 tons, highway bridge, to Fort Pitt Bridge Works Co.
HOLMDEL, N. J., 770 tons, hospital, to Bethlehem Construction Co.
WASHINGTON, 530 tons, hydraulic laboratory for Bureau of Standards, to Bethlehem Construction Co.
WASHINGTON, 1500 tons, Klinge Valley bridge, to McClintic-Marshall Corp.
BALTIMORE, 110 tons, building for A. Weiskittel & Son Co., to Belmont Iron Works.

The South

JONESVILLE, LA., 1100 tons, bridge over Black River, to Nashville Bridge Co.

Central and Northwest

CLEVELAND, 100 tons, Baltimore & Ohio warehouse, to Ingalls Iron Works.
CLEVELAND, 705 tons, John Carroll University, to Fort Pitt Bridge Works Co.
MICHIGAN CITY, IND., 450 tons, bridge, to Mount Vernon Bridge Co.
PEORIA, ILL., 325 tons, office and bank building, to Illinois Steel Bridge Co.
ROCK ISLAND, ILL., 950 tons, Government lock No. 15, to Worden-Allen Co.
MANITOWOC, WIS., 300 tons, high school, to Manitowoc Shipbuilding Co.
STATE OF MINNESOTA, 165 tons, bridge, to Minneapolis-Moline Power Implement Co.

Western States

DENVER, 700 tons, RKO theater, to Midwest Steel & Iron Co.
SAN FRANCISCO, 167 tons, apartment building on Pacific Street, to Western Iron Works.
SAN FRANCISCO, 500 tons, Pier 15, to Moore Dry Dock Co.

MERCED, CAL., 525 tons, overhead crossing, to Pacific Coast Engineering Co.
MERCED, 100 tons, H columns for overhead crossing, to Pacific Coast Steel Corp.
SACRAMENTO, 110 tons, hangar, to Palm Iron Works.
LOS ANGELES, 585 tons, plates, 40-in. welded steel pipe, to Western Pipe & Steel Co.
OLYMPIA, WASH., 125 tons, bridge in Chatham County, to Wallace Bridge & Structural Steel Co.
HONOLULU, 200 tons, plates, 30-in. welded steel pipe for Honolulu Iron Works, to Montague Pipe & Steel Co.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

STATE OF MAINE, 1158 tons, Androscoggin River bridge.
CAMBRIDGE, MASS., 107 tons, Everett Street apartment building.
NEW YORK, 5300 tons, first section of Sixth Avenue subway.
NEW YORK, 500 tons, grillage and slabs for viaduct in New York Central yards at Thirtieth Street; low bidder for contract reported to be Arthur McMullen Co.
NEW YORK, 200 tons, addition to public school 118.
NEW YORK, 200 tons, small loft building at 1220 Broadway.
NEW YORK, 250 tons, addition to East River Savings Bank, Ninety-sixth Street and Broadway; former bids rejected and plans redrawn.
BLAUVELT, N. Y., 500 tons, convent and chapel for Sisters of St. Dominic.
MERRICK, N. Y., 200 tons, grade school.
RIDGEWOOD, N. J., 200 tons, theater for Warner Brothers.
BERKS COUNTY, PA., 2500 tons, Court House.

South and Southwest

STATE OF TEXAS, 2400 tons, highway bridges.
GUTHRIE, OKLA., 400 tons, bridges.

Central and Northwest

CLEVELAND, 200 tons, warehouse for Strong, Carlisle & Hammond Co.
CHICAGO, 6000 tons, outer bridge; American Bridge Co., low bidder through

Ketler Elliott Co., which is low on general contract.

CHICAGO, 4000 tons, viaduct across Milwaukee Road and Chicago & North Western tracks.

CHICAGO, 2000 tons, fourth building for World's Fair; McLennan Construction Co., general contractor.

CHICAGO, tonnage not stated, Cook County Hospital Nurses' Home; bids to be taken in June.

CHICAGO, 4000 tons, track elevation work for Pennsylvania Railroad.

ST. PAUL, MINN., 750 tons, Pardozo building.

KANSAS CITY, MO., 3500 tons, Post Office; bids opened May 15.

STATE OF WISCONSIN, 900 tons, highway bridges.

WISCONSIN RAPIDS, WIS., 115 tons, State highway bridge, Waupaca County; bids opened April 30.

Western States

SALT LAKE CITY, UTAH, 1250 tons, steel pipe.
SAN FRANCISCO, 35,000 tons, plates, Hetchy Hetchy pipe line; bids May 6.
SAN FRANCISCO, 840 tons, plates, 40-in. welded steel pipe; Western Pipe & Steel Co., low bidder.
SAN FRANCISCO, 75,000 tons, Golden Gate Bridge; bids June 17; also 28,000 tons of steel cable.
OAKLAND, CAL., 175 tons, warehouse for Port Commission; bids April 27.



Fabricated Steel Orders Higher in March

WASHINGTON, April 28.—Orders for fabricated structural steel in March totaled 185,600 tons, or 46.4 per cent of capacity, comparing with 158,800 tons, or 39.7 per cent of capacity, in February, according to reports received by the Department of Commerce from producers. Orders in the first quarter of the current year were 506,800 tons, or 42.2 per cent of capacity, against 743,200 tons in the corresponding period of last year.

Shipments in March were 152,800 tons, or 38.2 per cent of capacity, compared with 166,800 tons, or 41.7 per cent of capacity, in February. Shipments in the first quarter of 1931 totaled 491,600 tons, or 41 per cent of capacity, against 774,800 tons or 64.6 per cent of capacity in the first quarter of 1930.

Orders for fabricated steel plate rose to 31,056 tons in March from 24,438 tons in February, according to reports received by the Bureau of the Census from 51 plants. The March orders in tons were distributed as follows: Oil storage tanks, 2538; refinery materials and equipment, 2925; tank cars, 1027; gas holders, 2036; blast furnaces, 833; miscellaneous, 21,697.

In the first quarter of the current year, orders totaled 83,102 tons, against 137,882 tons in the corresponding period of 1930.

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper Lower—Lead Reduced—Zinc at 3.40c.

COPPER

In the absence of sufficient demand to absorb the intake of custom smelters, the price of electrolytic copper has fallen to 9.50c. a lb., delivered in the Connecticut Valley. Sales were made by custom smelters at this level the latter part of last week. Most primary producers are either out of the market or quoting a higher price. Copper Exporters, Inc., still holds its quotation at 10.05c., c.i.f., usual European ports, but buying by foreign consumers has fallen off decidedly because of sales here at 9.50c. Total sales for shipment abroad have been about 17,000 tons thus far this month, which is close to the volume for the corresponding period of March. Lake copper is quiet, at 9.75c. to 9.87½c., delivered.

TIN

Spot Straits tin has fallen to the lowest price for this year, at 23.75c., New York. This is very close to the low level for 1930, which was 23.50c. Weakness in London prices and too much tin are the major causes. The London market broke sharply yesterday, due in part to liquidation by a New York Stock Exchange firm which recently failed, and also to large shipments from the East which, to April 25 inclusive, had been 7508 tons. London quotations today were about £3 a ton less than a week ago, with spot standard quoted at £107 5s., future standard at £108 12s. 6d., and spot Strait at £109 7s. 6d. The Singapore price today was £110 12s. 6d. Stocks in British warehouses for the week ended April 25 were 27,330 tons, an increase of 107 tons for the week. Very little buying is reported by either consumers or dealers.

LEAD

Three reductions within the week, the last one today, in the contract price of the American Smelting & Refining Co., brings the quotation down to 4.10c., New York. The corresponding quotation in the outside market is 3.90c., St. Louis. Buying is reported as very light and consisting of only carload and small lots for early delivery. Consumers have bought very little metal for May delivery.

ZINC

Further weakness has appeared, and prime Western zinc is down to

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Apr. 28	Apr. 27	Apr. 25	Apr. 24	Apr. 23	Apr. 22
Lake copper, New York.....	9.87½	9.87½	9.87½	9.87½	9.87½	9.87½
Electrolytic copper, N. Y.*.....	9.25	9.25	9.25	9.25	9.50	9.50
Straits tin, spot, N. Y.....	23.75	23.75	.....	24.50	24.75	24.75
Zinc, East St. Louis.....	3.40	3.40	3.50	3.50	3.50	3.52½
Zinc, New York.....	3.75	3.75	3.85	3.85	3.85	3.87½
Lead, St. Louis.....	3.90	4.05	4.05	4.05	4.15	4.25
Lead, New York.....	4.10	4.25	4.25	4.25	4.35	4.50

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

3.40c., St. Louis, or 3.75c., New York, the lowest levels since 1896. Too much zinc and lack of demand are the chief causes. Ore prices at Joplin have also fallen, the quotation now standing at \$20, the lowest since 1921. Sales were 5110 tons, and shipments were 7063 tons, with stocks at the end of last week at about 55,100 tons.

ANTIMONY

In a very dull market, Chinese metal is quoted at 6.85c. a lb., duty

paid, New York, for prompt shipment, with futures at 6.65c. to 6.70c.

NICKEL

Electrolytic cathodes are quoted at 35c. a lb., with shot and ingot made from remelted electrolytic at 36c. a lb., for single lots of spot metal.

ALUMINUM

Virgin metal, 98 to 99 per cent pure, is obtainable at the published price of 22.90c. a lb., delivered.

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass.....	17.25c.
*Copper, hot rolled, base sizes.....	19.87½c.
Seamless Tubes—	
Brass.....	20.12½c.
Copper.....	23.37½c.
Brass Rods.....	15.50c.
Brazed Brass Tubes.....	25.12½c.

*Extra for cold-rolled, 3c. per lb.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks.....	9.75c. to 10.25c.
Zinc sheets, open.....	10.75c. to 11.25c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	25.75c. to 26.75c.
Tin, bar.....	27.75c. to 28.75c.
Copper, Lake.....	11.00c. to 11.50c.
Copper, electrolytic.....	10.75c. to 11.25c.
Copper, casting.....	10.50c. to 11.00c.
Zinc, slab.....	4.75c. to 5.75c.
Lead, American pig.....	5.25c. to 6.25c.
Lead, bar.....	7.25c. to 8.25c.
Antimony, Asiatic.....	10.00c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	24.00c. to 25.00c.
Alum. ingots, No. 12 alloy.....	23.00c. to 24.00c.
Babbitt metal, commercial grade.....	25.00c. to 35.00c.
Solder, ½ and ¼.....	19.00c. to 20.00c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	29.13c.
Tin, bar.....	31.13c.
Copper, Lake.....	10.88c.
Copper, electrolytic.....	10.88c.
Copper, casting.....	10.25c.
Zinc, slab.....	5.50c.
Lead, American pig.....	5.00c. to 5.15c.
Lead, bar.....	8.00c.
Antimony, Asiatic.....	10.50c.
Babbitt metal, medium grade.....	15.75c.
Babbitt metal, high grade.....	23.50c.
Solder, ½ and ¼.....	19.75c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.50c.	8.50c.
Copper, hvy. and wire	7.25c.	8.25c.
Copper, light and bottoms	6.25c.	7.00c.
Brass, heavy.....	4.25c.	5.25c.
Brass, light.....	3.50c.	4.50c.
Hvy. machine composition	6.50c.	7.25c.
No. 1 yel. brass turnings	4.75c.	5.25c.
No. 1 red brass or compos. turnings..	6.00c.	6.75c.
Lead, heavy.....	3.00c.	3.50c.
Zinc.....	1.50c.	2.00c.
Sheet aluminum.....	10.00c.	12.00c.
Cast aluminum.....	5.00c.	7.50c.

Reinforcing Steel

Awards and Inquiries in Lighter Volume

WITH awards of 4000 tons and new projects of 3100 tons, the past week has been one of the quietest this year. The largest lettings include 700 tons for a store for Sears, Roebuck & Co., at New Orleans and 600 tons for an extension to the Market Street subway at Philadelphia. New jobs are mostly in small tonnages. Awards follow:

BEACON, N. Y., 225 tons, hospital, to Concrete Steel Co.
 PHILADELPHIA, 600 tons, extension to Market Street subway, to Truscon Steel Co.
 WASHINGTON, 210 tons, Pennsylvania Railroad tunnel under Arlington Memorial Bridge, to Concrete Steel Co.
 WHITFIELD, Miss., 250 tons, State insane hospital, to Connors Steel Co., Birmingham.
 NEW ORLEANS, 250 tons, wharf, to Connors Steel Co.
 NEW ORLEANS, 700 tons, store for Sears, Roebuck & Co., to Joseph T. Ryerson & Son, Inc.
 AURORA, Ill., 150 tons, bridge, to Olney J. Dean & Co.
 AURORA, 200 tons, Catholic hospital, to Truscon Steel Co.
 STATE OF ILLINOIS, 400 tons, road work, to Truscon Steel Co.
 CHICAGO, 450 tons, grain elevator, James Stewart Co., general contractor, to an unnamed bidder.
 PRAIRIE DU CHIEN, Wis., 125 tons, bridge, to Laclede Steel Co.
 SACRAMENTO, 254 tons, highway work in San Mateo County, to an unknown company.
 LOS ANGELES, 100 tons, open-air theater, North Highland Avenue, to an unknown bidder.
 BREMERTON, WASH., 100 tons, Puget Sound Navy Yard, to Pacific Coast Steel Corpn.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

STATE OF CONNECTICUT, 400 tons, various State projects.
 BOSTON, 250 tons, Charlestown district school.
 NEW YORK, 450 tons, subway section on Sixth Avenue.
 YONKERS, N. Y., 100 tons, grade crossing elimination at McLean Avenue; J. J. Farley Construction Co., Croton, N. Y., low on general contract.
 BUFFALO, 300 tons, Niagara Frontier market.
 CLEVELAND, 150 tons, tuberculosis hospital.
 AURORA, Ill., 185 tons, hospital; this is in addition to a previous hospital inquiry.
 CHICAGO, tonnage not stated, 23 subways for Pennsylvania Railroad track elevation.
 CHICAGO, tonnage being estimated, Historical Society building, in Lincoln Park.
 ROCKFORD, Ill., 100 tons, Charles Street bridge.
 MINNEAPOLIS, 500 tons, lock on Mississippi River; Paper, Calmenson & Co., general contractors.

ST. LOUIS, 1100 tons, coverings for two storage reservoirs for municipal waterworks at Compton Hill; J. J. Gilmore, Chicago, low bidder on general contract.
 SACRAMENTO, 305 tons, bridge over San Diego River; bids opened.
 SACRAMENTO, 112 tons, bridge over Santa Ana River; bids May 13.
 SAN FRANCISCO, 255 tons, Hetch Hetchy pipe line; bids May 6.

Railroad Equipment

Union Pacific has ordered 20 locomotive tenders from Baldwin Locomotive Works.

Chicago, Burlington & Quincy is inquiring for one gas-electric locomotive.

Thunder Bay Quarries Co., Pittsburgh, has contracted with Koppel Industrial Car & Equipment Co. for six 250-cu. yd. two-way air dump cars.

Chicago Surface Lines have awarded Westinghouse Electric & Mfg. Co. an order for installation of electrical equipment on 21 trolley buses.

Government Buys French Fittings, Causing Protest

WASHINGTON, April 27.—Submitting a figure of \$66.80 a net ton, f.o.b. Washington, the Herbert Kennedy Co., New York representative of the Societe Anonyme Des Hauts Fourneaux et Fonderies de Pont-a-Mousson, Pont-a-Mousson, France, was the low and successful bidder to supply the District of Columbia with 223 tons of cast iron pipe fittings. The duty on cast iron pipe fittings is 25 per cent.

Bids were also received from nine domestic producers, some of whom made vigorous protest against awarding the contract to the Kennedy company. At the same time, C. V. Maudlin, Washington representative of the Kennedy company, and Commercial Attache M. Garreau of the French Embassy pointed out that the New York importer made the lowest bid and should be given the business. Mr. Maudlin indicated that if the award did not go to the Kennedy company the matter would be laid before the State Department.

The Rudisill Foundry Co., Anniston, Ala., making a bid of \$68.60, said in its protest that if its cash discount offer for payment within 10 days were accepted its price would be \$67.23 a ton, thus making it only 43c. a ton over the Kennedy figure. This company contended that the contract should go to an American maker because of the effect on the employment situation. The Lynchburg Foundry Co., Lynchburg, Va., made a bid of \$68.10. Other bidders included Crane & Co., Washington; Warren Pipe & Foundry Co., New York; United States Pipe & Foundry Co., Philadelphia; American Cast Iron Pipe Co., Birmingham; R. D. Wood & Co., Philadelphia; Donald H. Walter & Co., New York, and Glamorgan Pipe

& Foundry Co., Lynchburg, Va.

The award was made only after Purchasing Officer M. C. Hargrove asked the Bureau of Standards to pass upon the respective quality of the American and French material. The bureau referred to a report made in 1927 regarding American and French cast iron pipe, in which it was held that the latter came within the specification of the American Waterworks Association, though higher in phosphorus and more brittle than the American pipe. On this finding, the bureau told Mr. Hargrove that "it is fair to assume that the (French) fittings would come within the specifications of the American Waterworks Association."

Meanwhile, Capt. Hugh P. Oram, assistant engineer commissioner, who had recommended against purchase of the French fittings, has stated that a test will be made of the material as soon as it is received and if the fittings do not meet specifications they will be rejected.

Promotion Plan Adopted for Zinc-Coated Sheets

The American Zinc Institute, which held its thirteenth annual meeting at Hotel Statler, St. Louis, April 20, 21 and 22, decided to inaugurate an active campaign of education as to the value of using zinc-coated steel sheets for various uses. The necessary fund for the work is to be realized by an assessment of 50c. a ton on slab zinc and 12½c. a ton on zinc concentrates.

The plan was adopted following a report by Julian D. Conover, secretary of the institute, who explained the importance and necessity of requiring zinc-coated sheets to be made to a guaranteed standard and contain a sufficient quantity of zinc to restore confidence in and demand for galvanizing materials. After tests, the committee found a minimum weight of 14 oz. of zinc per sq. ft. as most desirable for certain types of zinc roofing.

G. C. Bartells, technical assistant for the institute, reported on his special research work to ascertain the condition of galvanized roofs in various parts of the country, particularly among farmers, who are extensive users of galvanized products. He examined 528 roofs, from which he selected 22 galvanized sheets, which were exhibited at the convention to show the bad effects of inadequate zinc coating. He recommended using heavy zinc coating, with sheets marked and stamped as a proper guarantee of quality.

Roy De Steabler of Beck & Corbitt Co., St. Louis, discussing "What the Jobber Thinks of Heavy Galvanized Sheets," told of the decline of the galvanizing industry during the last few years, and suggested to the zinc men that if they could establish a 1¼-oz. zinc sheet they would have something that would last 20 to 30 years.

March Motor Car Output 276,341 Units

WASHINGTON, April 28.—Making an increase of 56,402 units, the March production of motor vehicles in the United States totaled 276,341, against 219,939 in February, according to the Bureau of the Census. This marked the fourth successive monthly increase. The passenger car output rose 50,945 units to a total of 230,835, while truck production increased 5576 and totaled 45,096. Taxicab production declined to 410 from 529.

In the first quarter of 1931, motor vehicle production in the United States was 668,131, compared with 1,000,023 in the corresponding period of last year. The passenger car output was 548,530, against 848,195, while truck production was 118,150, compared with 148,589.

The production of motor vehicles in Canada in March totaled 12,993, against 9871 in February. The passenger car output increased to 10,483 from 7529, while the truck production rose to 2510 from 2342.

In the first quarter of the current year Canadian production totaled 29,360, compared with 46,666 in the corresponding period of last year. The passenger car output was 22,564, against 39,042, while the truck production was 6796, as against 7624.

Rail-Truck Freight Haul in Portable Containers

In an address before the National Petroleum Association at Cleveland on April 24 Elisha Lee, vice-president of the Pennsylvania Railroad, described the inauguration of a special service for less-than-carload freight in cooperation with motor trucks. He said that portable containers, so constructed that they may be carried on motor trucks in the terminal zones between store door and rail head and on specially equipped flat cars for the rail haul from city to city, are being utilized.

Mr. Lee said that success in this field has led to further studies, having for their object a return to the rails of certain traffic now moving by highway wherein the services of the railroad and the motor truck will be coordinated. Studies were made of conditions between Philadelphia and New York, where it was found that the actual cost of running a loaded truck between the two cities is about 30c. a mile. The Pennsylvania Railroad found that it could transport detachable loaded bodies by rail with store-door delivery in terminal zones at 15c. a mile, including profit for the road.

"We intend in the near future," said Mr. Lee, "to ask authority for the initiation of such a service in co-operation and coordination with truck lines now operating. The trucker will collect and deliver in both cities be-

tween the rail stations and the store-door of shipper or consignee. We will carry his truck body for him between the cities for half what it costs under his own power. This will allow the trucker to earn more satisfactory profits. It will bring back remunerative business to the railroads. It will make possible performance of the whole service at less cost to the shipper than at present."

Service of this kind has been inaugurated by the Pennsylvania Railroad between Baltimore and points on the Delmarva Peninsula. In this service portable truck bodies are carried across Chesapeake Bay on boats, and transported by rail to Salisbury, Md., whence they are distributed on truck chassis to various peninsular communities.

Steel Barrel Output Takes Sharp Rise

WASHINGTON, April 28.—Making an increase of 100,624 units, the production of steel barrels in March rose to 550,758 from 450,134 in February, according to reports received by the Bureau of the Census from 27 establishments operating 32 plants. Shipments increased 104,847 units, rising to 554,332 from 449,485. Stocks at the end of March declined to 59,670 from 63,244. Unfilled orders for delivery within 30 days at the end of March were 242,626 barrels, against 231,738 at the end of February. Unfilled orders for delivery beyond 30 days were 1,010,753, compared with 1,160,354.

The total production in the first quarter of 1931 was 1,422,706 barrels, against 2,027,159 in the corresponding period of last year.

Mechanical Engineers Visit Birmingham

(Concluded from page 1460)

ahead and the other beyond the screen.

In the safety session David S. Anderson, manager department of safety, Sloss-Sheffield Steel & Iron Co., Birmingham, pointed out that great injustice can be done to injured workmen through anxiety to make a good "lost-time" record.

"Sometimes the temptation is great for the safety engineer or foreman, striving for a low accident frequency record, to require a slightly injured person to report for duty at the beginning of the next shift and perform some work of some sort for an hour or a portion of the day at least, so as to bring the case within the rule of classification of no lost-time accident. This, to say nothing of the injustice to the employer in placing a man on the payroll who is unable to earn his pay, also creates a strong

temptation to the safety engineer or foreman to use his own unskilled judgment as to the extent and probable effect of the injury, thus invading the prerogative of the doctor (to whom all injured persons should promptly be sent) and possibly to endeavor to influence the doctor to minimize an injury to the ultimate detriment or harm of the injured person. The placing of an employee back at work under these circumstances is very often most harmful and sometimes results in infection of a serious nature, some of which the doctor would probably avert by prescribing rest for the injured for a short period, with proper treatment and dressings under sanitary surroundings conducive to uninterrupted recovery. . . .

"Accidents are most likely to occur during times of financial depression when workmen value their jobs most. In such times many workers become timid and nervous, have fears of becoming discharged, and are incapable of using their best judgment in doing their work well and in a safe manner to themselves and others. This factor of fear is also instilled by other circumstances and frequently by over-parading of safety posters, safety programs, contests and the like."

Meeting Shows Welding Progress

(Concluded from page 1464)

the metal arc process for a large number of copper alloys were given by Ira T. Hook, research engineer, American Brass Co., Waterbury, Conn., in a paper on "Metal Arc Welding of Copper Alloys." The investigation covered electrodes and base metal.

Electrolytic copper sheet up to 1/8 in. in thickness can be readily metal arc welded using a deoxidized copper electrode or a hardened copper electrode such as Everdur. Higher current values are required than with ferrous metals in order to overcome the high heat transfer rate of the copper. In sheets thicker than 1/8 in., the usual bare rod cannot deliver enough heat to secure proper fusion. Deoxidized copper sheet welds similarly to electrolytic copper except that its heat conductivity is slightly lower.

The weldability of brass is limited by reason of the tendency of the zinc to burn out in the heat of the arc. The thinner sheets of brass carrying 35 per cent of zinc or less can be metal arc welded using a phosphor bronze electrode.

Silicon hardened copper is by far the most weldable of any metal in the copper alloy series. It is readily metal arc welded using an electrode of similar composition, developing nearly full strength of material.

In the discussion following presentation of his paper, Mr. Hook indicated that work is being done on the welding of so-called extruded metal.

British Research Council Studies Means of Reorganizing Steel Industry

(By Cable)

LONDON, ENGLAND, April 27.

IN behalf of the British steel makers the National Federation of Iron and Steel Manufacturers has replied to the Government's recent declarations and charges, in its memorandum, which states that recent utterances by the Prime Minister and President of the Board of Trade are calculated to give the impression that industry is doing nothing to improve its position.

The Federation has instituted an Iron and Steel Industrial Research Council to promote production economies and states that it has certain of the keenest intellects in the scientific world as well as the steel industry grappling with current problems and that great progress has been made.

Regional reorganization of industry is progressing, showing that industry is fully awake to the advantages of large-scale production and export trade is being promoted by the formation of a British Steel Export Association. The British Steel Works Association has promoted research into building regulations with a view to making possible increased use of structural steel.

A. L. Ayre, chairman of the Shipbuilding Employers' Federation, recently described the shipbuilding outlook as of unrelieved gloom. Orders, he said, could scarcely be obtained on any terms. Foreign competition is intense and the industry must consider

British Steel Export Association organized to promote foreign trade.

* * *

Chinese award 8000 tons of cast iron pipe to French maker.

* * *

European freight rates to Far East reduced to 16s. (\$3.89), third revision in a year.

* * *

United States leads with 31.8 per cent of world machinery exports, says German Federation of Machinery Manufacturers.

▲ ▲ ▲

immediately the possibilities of reducing labor costs, especially by reconsideration of time workers' wages.

The shipbuilding slump is paralyzing associated industries and in consequence pig iron demand has been reduced to low levels. Producers are unable to obtain export orders and the present output is more than sufficient to meet current demands. Consumers believe that price reductions are the only alternative to blowing out more blast furnaces, but makers are still unwilling to lower the market.

Finished iron and steel products are quiet, and heavy mills are continuing

operations with difficulty. Export demand is especially poor.

Continental market prices are less firm as a result of declining demand and quicker delivery. British users of Continental steel are showing no interest in buying and overseas demand is spasmodic. A good order for mild steel bars could probably be placed at £3 15s. per ton (82c. per 100 lb.), f.o.b. port.

The Continental Wire Rod Cartel at its Luxemburg meeting, April 21, reaffirmed prices and quotas.

The tin plate market is dull and some works have sold under 15s. (\$3.65) per base box, f.o.b. works port. Many, however, are unwilling to accept orders at current prices. The Continent is the best prospective export market for tin plate, as other markets are under the influence of adverse exchanges and finances.

Galvanized sheets are quiet. There is a moderate demand for small lots of Japanese specification black sheets and business has been done in these light gages at £10 5s. (\$49.82) per ton, f.o.b. works port.

John Summers & Son have closed the Shotton Steel Works and are buying Continental semi-finished steel for their sheet mills. R. & W. Hawthorn, Leslie & Co. have secured a contract for two armed sloops for the Portuguese Navy.

The Chamber of Shipping reports total British tonnage laid up in April at 761 vessels of 1,867,000 tons, representing 3,000,000 gross tons. This

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp with the £ at \$4.8665 (par)

British Prices, f.o.b. United Kingdom Ports				Billets, Thomas (nominal) £3 7s. to £3 9s. \$16.28 to \$16.77			
Ferromanganese, export.	£9 0s. to £11 5s.	\$43.74 to \$54.75		Wire rods, low C., No. 5			
Billets, open-hearth.....	5 2½ to 5 10	24.91 to 26.76		B.W.G.	5 2½ to 5 7½	24.94 to 26.15	
Black sheets, Japanese specifications	10 5 to 0 15½	49.82 to 3.77		Rails, light	6 0	29.20	
Tin plate, per base box..	0 15 to 0 15½	3.65 to 3.77		Black sheets, No. 31 gage, Japanese.....	11 5 to 12 12	54.68 to 58.32	
Cents a Lb.				Cents a Lb.			
Steel bars, open-hearth..	7 17½ to 8 7½	1.71 to 1.81		Steel bars, merchant....	3 16 to 3 17	0.82 to 0.83	
Beams, open-hearth.....	7 7½ to 7 17½	1.60 to 1.71		Beams, Thomas, British standard (nominal)...	3 10 to 3 12½	0.78 to 0.80	
Channels, open-hearth..	7 12½ to 8 2½	1.66 to 1.76		Channels, Thomas, American sections.....	5 12 to 5 14	1.24 to 1.26	
Angles, open-hearth.....	7 7½ to 7 17½	1.60 to 1.71		Angles, Thomas, 4-in. and larger, over ¾-in. thick	3 16 to 3 17	0.82 to 0.83	
Black sheets, No. 24 gage	8 10 to 8 10	1.84 to 1.71		Angles, Thomas, 3-in....	3 18 to 3 19	0.84 to 0.85	
Galvanized sheets, No. 24 gage	11 0 to 2.42			Hoop and strip steel over 6-in. base.....	4 7½	0.94	
Continental Prices, f.o.b. Antwerp or Hamburg				Wire, plain, No. 8 gage..	5 0	1.10	
Poundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.,	£2 9s. to £2 10s.	\$11.90 to \$12.15		Wire, barbed, 4-pt. No. 12 B.W.G.	9 0	1.91	

is an increase of 19 per cent over the previous quarter and 112 per cent over a year ago.

The French Pont-à-Mousson works has secured an order for 8000 tons of cast iron pipe for Nanking, China. Polish production in the first quarter was 105,000 tons of pig iron, 290,000 tons of raw steel and 200,000 tons of rolled steel. Polish iron and steel exports from January to March reached 95,000 tons.

Saar output in March was 149,000 tons of pig iron, 138,000 tons of raw steel and 107,000 tons of rolled steel.

Czechoslovakian output in March was 102,000 tons of pig iron, and 127,000 tons of raw steel.

German production in March was 583,000 tons of rolled steel.

Luxemburg output was 178,000 tons of pig iron and 172,000 tons of raw steel. At the end of March 25 furnaces were in blast.

German Alloy Exports Mostly Tungsten Bearing

HAMBURG, GERMANY, April 15.—As Germany is the principal European exporter of alloy steels, information on annual export business made available by certain leading mills is of interest. During the past three years, according to these companies, about 27 per cent of their alloy steel shipments abroad were in the tungsten alloy group, and about 90 per cent of these were from 14 to 18 per cent tungsten content. The next largest group of alloys were chrome-nickel, representing about 17 per cent of the total exports. Chrome-vanadium, chrome - vanadium - nickel and vanadium-molybdenum alloys represented about 14 per cent of the total, chrome-molybdenum about 12 per cent and molybdenum-nickel about 7 per cent. The remaining 23 per cent of total exports covered a wide variety of alloys.

United States Leads as Machinery Exporter

HAMBURG, GERMANY, April 15.—Statistics compiled by the German Federation of Machinery Manufacturers show the principal countries engaged in machinery exports as having the following percentages of world business in 1913, 1929 and 1930:

	1930 Per Cent	1929 Per Cent	1913 Per Cent
United States	31.8	35.8	26.8
Germany	28.9	25.2	29.1
Great Britain	18.4	19.6	28.4
Canada	1.4	1.6	0.4
Sweden	2.9	3.6	2.3
All others	16.6	14.2	13.0

Most of the exports included in all others are from France, Belgium, Czechoslovakia, Austria and Italy. From the foregoing table it may be noted that the United States has advanced from third position prior to the war to first place in exports and that Canada's position as a machinery exporter has been materially improved.

Opel Motor Works Increasing Output

HAMBURG, GERMANY, April 15.—The Opel Motor Co., German subsidiary of the General Motors Co., reports that demand for its small cars has been 40 per cent greater this year than in 1930 and it is now employing 8000 men in its plant compared with 6000 a year ago. Demand is for the company's new six-cylinder, 1.8 liter car selling for 3,195 m. (\$764).

German Steel Cartel Lists 36 Members

HAMBURG, GERMANY, April 15.—A new list of members just published by the Deutsche Rohstahlgemeinschaft (German Raw Steel Cartel) shows 36 companies, compared with 35 a year ago, and 24 works listed as "recognized." These recognized works are mostly small plants, not members of the cartel but willing to cooperate with it. Two companies are listed as having withdrawn from membership, the Hallesche Rohrenwerke Halle a.d.S. and the Gebrüder Hover Werke Kaiserau.

Belgians Form Railroad Wheel and Axle Cartel

HAMBURG, GERMANY, April 15.—Belgian manufacturers of railroad car wheels and axles have formed a sales organization known as the "Groupe-ment des Fabricants Belges de Bandages et d'Essieux en Seraing." The new cartel is negotiating with the German association of makers, and a joint cartel, which would virtually control the entire European output, appears to be in prospect.

European Freight Rates to Far East Reduced

HAMBURG, GERMANY, April 15.—Freight rates from European ports to the Far East have again been reduced, so that wire rods and all wire products, sheet piling and other finished materials are now 16s. (\$3.89) a ton, with an additional 1½ per cent rebate on tonnage. As a result, the c.i.f. quotations of European mills have been considerably reduced in Far Eastern markets. Only a year ago the freight rate to Far Eastern ports was 35s. (\$8.50) a ton. The three reductions in the rate in a period of a year are caused by competition, especially from Japan. The new rates are lower to Osaka and Hong Kong than the Japanese.

With the Far Eastern freight rates reduced, it is now expected that substantial reductions from European

ports to the West Coast of South America will be made before long. The North German Lloyd Line is operating fast ships between European ports and Chile, and other lines are either placing faster ships in service or quoting minor reductions in the freight rates. South American buyers are inclined to delay buying, apparently believing that a general reduction in c.i.f. prices may be made as a result of lower ocean freight rates. While it is suggested in certain quarters that ocean rates from the United States to the West Coast of South America may be reduced, it is also pointed out that the American charge has for some time been higher than the rate from Europe.

Commodity Prices Are Still Falling

Wholesale prices of commodities, as reported upon by the United States Bureau of Labor Statistics, showed a further drop in March to an index of 74.5, compared with 75.5 in February. There has been a practically uninterrupted decline since July, 1929, when the index stood at 98.

Most of the current decline is accounted for by a sharp drop in oil prices, which reduced the fuel and lighting material group from 69.6 to 64.5. Only one other group—textiles—dropped as much as one point. There were partial offsets by fractional increases in the indexes for farm products, hides and leather, metals, building materials and miscellaneous.

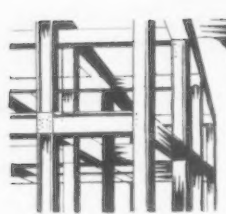
Metals went up from 88.9 to 89 through an increase of one point in the non-ferrous index, partially offset by a drop of 0.3 point in the iron and steel index, which declined from 88.4 to 88.1. Structural steel in the building material group showed no change, at 84.3. Agricultural implements at 94.7, automobiles at 98, and "other metal products" at 95 were likewise unchanged.

Of the three general headings of raw materials, semi-manufactured articles and finished products, all showed declines. Raw materials dropped from 70.6 to 69.4; semi-manufactured articles, from 72.3 to 72.2; finished products, from 79.3 to 78.4.

More Accidents in Iron and Steel Plants

Accidents increased in both severity and frequency in 1929 in the iron and steel industry. This was the first increase in frequency reported by the United States Bureau of Labor Statistics since 1922 and the first increase in severity since 1926.

Comparing 1929 with 1928, the frequency rate rose from 19.7 to 24.3 for each 1,000,000 hr. exposure. The severity rate went up from 2.2 to 2.6 for each 1000 hr. exposure.



PLANT EXPANSION AND EQUIPMENT BUYING



Machine Tool Buying Is Slowing Up

Little Hope Now for Revival of Business on Favorable Scale Before Fall

MACHINE tool business is apparently in a slow decline from the March peak. April business is generally reported as lighter than that of the previous month, and prospects are diminishing to an extent that leaves little hope

of a substantial revival of buying before fall at the earliest.

Business is highly irregular, it being the experience of many sellers that a poor week may be followed by a fair one, or the reverse, but on the whole the trend is downward.

The Chicago market has had some revival of activity through the purchase by the Santa Fe Railroad of a number of items that have been pending for some time and the appearance of a new list of 16 tools for the Milwaukee Road.



NEW YORK

For many of the machine tool sellers in the East, April was the poorest of the four months of this year. Some did slightly more business than in either January or February, but sales totals for the past month were generally lower than for March. Developments of the month have convinced the trade that not much substantial improvement is to be expected before fall. Sales of machines for the manufacture of building products have been fairly active, but other lines of manufacture are not adding much new equipment. Single items comprise most of the current business.

CHICAGO

A trifle better tone is noticeable in the local machine tool market. The Santa Fe has started to buy against its list of several months' standing and the Milwaukee Road is issuing a supplemental list of 16 tools. Allis-Chalmers Mfg. Co., Milwaukee, is said to have ordered a large lathe and the Illinois Steel Co. has purchased additional items. Used machine tools, though below seasonal expectations, nevertheless are more active in proportion than new tools. More delays are in sight for the purchase of equipment for Chicago public schools. There is to be a school election on May 1 and no appointments have as yet been made by the new city administration.

Milwaukee Road's new list: One 24-

in. boring mill, one ½ to 2-in. portable pipe cutting and threading machine, one portable open-throat punch, one 350-g.p.m. vertical pump, one 2 x 12-in. grinder, two pressure blowers, one 10-g.p.m. bilge pump, two 3 x 18-in. double grinders, one ½-ton air hoist, three 1-ton air hoists, two pneumatic wrenches.

PITTSBURGH

Machine tool orders are light and inquiry is somewhat restricted. Several dealers have sold a few tools, but no awards of any consequence have been reported.

Considerable interest is centered in the market for heavy machinery and equipment. Although no recent inquiries for steel mill equipment have been issued, the larger builders in the district are said to be negotiating for several large orders, and with unfilled commitments rather large, prospect for the year's operations is good.

CLEVELAND

Machine tool business and inquiry was light the past week and the trade sees little prospect of an early revival. The aggregate amount of business in this territory during April will probably be slightly below the March volume. While managements of many metal-working shops feel the need of replacing some obsolete equipment, they are not disposed to purchase new tools until plants are busier. Russian

purchases of American machinery are still being made by the Amtorg Trading Corp. for the Autostroy automobile plant, but it is expected that the next large Russian purchase, which will be for an anti-friction bearing plant, will be made in Germany. The machinery trade is finding some encouragement in a considerable increase in orders for machine repair parts.

MILWAUKEE

Inquiry continues moderately active and covers widely diversified industries. Orders are of moderate volume and enable tool builders to maintain working forces at the recent level. Lack of volume buying by the automotive industries is probably the most disappointing feature of the situation. There is plenty of inquiry out, but buying, as a rule, awaits improvement in the demand for cars and trucks. As before, replacements dominate buying. Nearly all purchases are for single tools.

NEW ENGLAND

Some machine tool manufacturers see quite a little prospective business, especially for export, but others have little on their books or in view and are operating on reduced schedule. Dealers' sales are confined to an occasional single tool. There is a large number of quotations outstanding, but appropriations are difficult to obtain. Little



BULLARD

INDIVIDUAL feeds and speeds at each station through independent control is the outstanding feature of Multi-Au-Matic productive ability.

The universal adaptability of Multi-Au-Matics to an extensive variety of jobs is only possible because of the extreme flexibility of the standard machine and the diversity of its tool applications.

Detailed information sent promptly upon request.

THE BULLARD COMPANY
Bridgeport, Conn.

activity is reported in the used tool market.

Small tool sales hold up well, but purchases are still on a hand-to-mouth basis.

CINCINNATI

Fresh bookings are low and inquiry is beginning to drag. Except for an occasional single tool order, local manufacturers are without any business. In fact, in certain quarters the past week further curtailment of operations has become imperative. It is doubtful whether the April volume of sales will equal those in March. Local manufacturers, however, feel that a change in conditions is bound to result in the near future.



New York

DEPARTMENT of Docks, Pier A, North River, New York, has secured appropriation of \$17,000,000 for construction of five piers on North River, four to be 1100 ft. long and 125 ft. wide, each, and one 775 ft. long and 100 ft. wide, double deck, equipped with loading, conveying and other mechanical-handling equipment. Project will require about 36 months for completion.

William Shary, 22 East Seventeenth Street, New York, architect, has plans for a four-story automobile service, repair and garage building, 100 x 100 ft., to cost about \$130,000 with equipment.

American Radiator & Standard Sanitary Corp., 40 West Fortieth Street, New York, has purchased Central Supply Co., Minneapolis, plumbing equipment and supplies, and will operate as a subsidiary. Company has also purchased Cochran-Sargent Co., St. Paul, plumbing and heating equipment, and will continue as a subsidiary. Expansion and improvements will be carried out by purchasing company.

Paul H. MacNeil, Winema Estates, Huntington, L. I., and associates have organized MacNeil Instrument Corp., and plan operation of factory for manufacture of measuring instruments and devices. Robert L. MacNeil, North Hempstead Turnpike, Great Neck, L. I., will be an official of new organization.

Gordon Plumbing & Supply Co., Inc., Seventy-sixth Street, Glendale, L. I., plumbing and heating equipment, has plans for extensions and improvements in shop, storage and distributing plant to cost about \$35,000. A. Abrams, 102 Melrose Avenue, Lynbrook, L. I., is architect.

Department of Sanitation, Municipal Building, New York, has awarded contract to William H. Gahagan, Inc., 147 Remsen Street, Brooklyn, for sewage disposal plant on Ward's Island, to cost \$3,867,780.

Signal Supply Officer, United States Army, Army Base, Brooklyn, is asking bids until May 12 for 2000 diagonal cutting pliers, 200,000 ft. wire, 56,100 ft. cable, and 47 cable reels; until May 15 for 5500 brass attaching plates.

Department of Hospitals, Municipal Building, New York, has plans for a new steam-operated electric generating plant in Brooklyn, to cost over \$500,000 with equipment. LeRoy P. Ward, Inc., 205 East Forty-second Street, is architect.

Morris Silverberg, New York, has leased floor in building at 54 East Eleventh Street, for manufacture of die-cutting tools and specialties.

American Hard Rubber Co., 11 Mercer Street, New York, has awarded general contract to Walter Kidde & Co., Inc., 140 Cedar Street, for one-story addition to plant at Butler, N. J., 92 x 272 ft., for production of tank linings for railroad cars and similar heavy products, to cost about \$100,000 with machinery. Robert Johnson is company engineer.

Board of Education, 31 Green Street, Newark, R. D. Argue, secretary, will receive bids until May 6 for sharpening tools, electrical equipment and supplies, iron and steel, manual training work benches, scientific apparatus and supplies and other equipment for public schools.

Triplex Safety Glass Co. of North America, Brighton Avenue, Clifton, N. J., manufacturer of non-shatterable sheet glass products, is planning expansion, including a new factory unit to cost over \$85,000 with equipment. W. C. Alcorn is vice-president and general manager.

Oakley Valve & Foundry Co., 48 Frelinghuysen Avenue, Newark, manufacturer of valves, castings and other engineering specialties, has leased one-story building at Maplewood, N. J., for a new plant. It is proposed to move to new location at once.

Board of Education, Bloomfield, N. J., has authorized installation of manual training equipment in new school to be erected at Watchung and Broughton Avenues, Brookdale district, to cost about \$200,000.

Montgomery Cylinder & Grinding Co., 678 Montgomery Street, Jersey City, N. J., operating an automobile engine grinding and repair works, has awarded general contract to L. Saginario & Co., 67 Beacon Avenue, for a two-story plant to cost about \$40,000 with equipment. Oscar L. Wutzdorff, 437 Ogden Avenue, is architect.

Board of Education, Essex County Vocational Schools, Hall of Records, Newark, is arranging an additional fund of \$75,000 for new boys' vocational school at Bloomfield, now nearing completion, of which about \$52,000 will be used for purchase of equipment.

Port of New York Authority, 80-90 Eighth Avenue, New York, is asking bids until May 18 for one and two-story field building, 86 x 194 ft., at Fort Lee, N. J., to be used in part for a repair shop.

Industrial Plants Corp., Columbus, Ohio, will sell at public auction on May 16 entire business of General Airplanes Corp., Garden City, L. I., including patents, patterns, machinery, etc.



New England

BOARD of School Commissioners, Cambridge, Mass., has plans for a multi-story technical high school with vocational departments, to cost over \$1,000,000 with equipment. Ralph H. Doane, 60 Batterymarch Street, Boston, is architect.

Union Metal Works, Inc., Carter Street, Chelsea, Mass., manufacturer of plumbers' metal goods, has purchased equipment, patterns and other assets of Hamlin & Emery Brass Co., 49 Island Avenue, Boston, which recently suspended oper-

ations, and will remove to plant at Chelsea, where expansion will be carried out.

Brockton Last Mfg. Co., Brockton, Mass., has been organized with capital of \$100,000 to take over and expand Brockton Last Co., with local plant for manufacture of iron shoe lasts, etc. Henry L. Moorhouse is president of new organization.

Merrimac Chemical Co., Everett, Mass., manufacturer of industrial chemicals, has awarded general contract to A. C. Peters Co., Inc., 46 Cornhill Street, Boston, for two-story addition, 60 x 140 ft., to cost over \$75,000 with equipment.

Frederick A. Oefinger, Emaus, Pa., and associates have leased plant of Plantsville Foundry Corp., Plantsville, Southington, Conn., closed for about a year, and will resume production in May, specializing in manufacture of gray iron castings. Mr. Oefinger will succeed Thomas W. Thomson as president of company.

Conveying and mixing equipment will be required for improvements to be made by New England Fuel & Transportation Co., Everett, Mass., to cost \$86,700.

Bristol Co., Waterbury, Conn., has plans by Fred A. Webster, 41 West Main Street, for an addition for which miscellaneous electrical equipment will be required.

John J. Adams, Nebraska Street, Worcester, Mass., manufacturer of cutting dies, is taking bids on plant expansions.

J. R. and J. A. Whelan Co., Inc., 135 Pelham Street, Newport, R. I., has been awarded contract for an extension to Newport torpedo station, Newport, to cost \$64,000.



South Atlantic

PLANs are being considered by Elk Mills Fabric Co., Elk Mills, near Elkton, Md., for a hydroelectric power plant on Big Elk River, where power site has been selected, to cost over \$75,000 with equipment. William R. Baldwin is president.

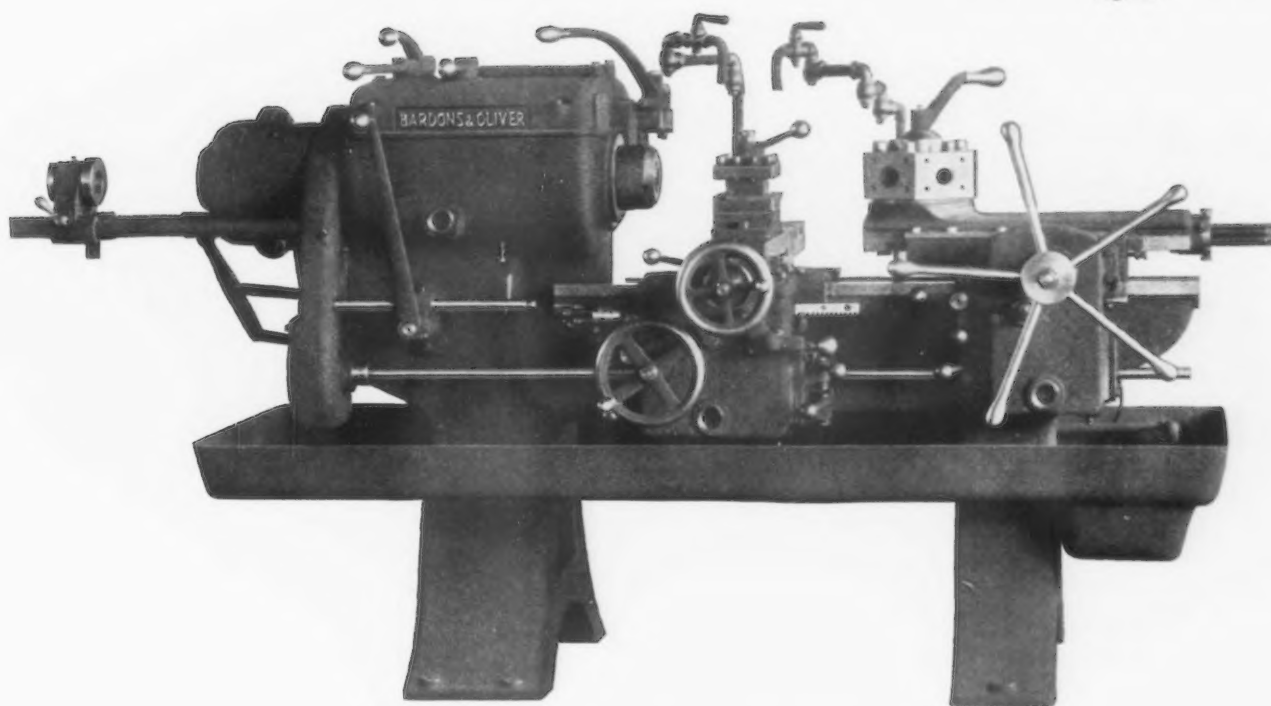
Common Council, Centerville, Md., will dispose of a bond issue of \$70,000 for extensions and improvements in municipal electric light and power plant, including additional equipment.

Board of District Commissioners, District Building, Washington, will receive bids until May 13 for 40,000 steel sheets, 13 x 61-in., for automobile license plate manufacture, with alternate bid for 400,000 steel blanks, 6 x 13-in., with rounded corners; until May 11 for projection equipment and accessories for public schools.

Campbell Metal Window Co., Hamburg and Bush Streets, Baltimore, manufacturer of steel sash, windows, etc., has awarded general contract to Davis Construction Co., 9 West Chase Street, for a one and two-story addition, 25 x 200 ft., and 80 x 100 ft., to cost over \$65,000 with equipment.

Sawyer Coal & Ice Co., 277 Walnut Street, Macon, Ga., has plans for one-story electric-operated ice-manufacturing plant at Cordele, Ga., to cost close to \$75,000 with machinery. C. T. Baker, Walton Building, Atlanta, Ga., is engineer.

George B. Crocker, heretofore general manager of Crocker Machine & Foundry



Bardons & Oliver
No. 4 Universal Turret Lathe
featuring
Higher Speeds and Increased Power

Automatic Chuck Capacity, 1-13/16"—Swing Over Bed, 18"
Spindle Speed of Over 1000 R.P.M.
7½ H.P. Flanged Type Motor, Bolted Direct to Rear End of Head
12 Speed Head with Sliding Gears and 4 Multiple Disc Clutches
Anti-Friction Bearings Throughout, Including Spindle
Helical Gears on Spindle and High Speed Shafts
All Head Gears and Shafts of Heat Treated Alloy Steel
Flanged Type Spindle End
9 Feed Changes to Turret, Carriage, and Cross Slide Complete in Aprons
Feed Change Gears of Heat Treated Alloy Steel Sliding on Splined Shafts
Head and Aprons Completely Enclosed and Flood Lubricated
Coolant Pump Driven at Constant Speed by Individual Motor

Write for descriptive circular B

BARDONS & OLIVER
Turret Lathes & Cutting Off Machines
Cleveland, Ohio

Co., Gastonia, N. C., manufacturer of textile machinery and parts, has acquired a controlling interest in company and will reorganize to carry out expansion and improvements. Mr. Crocker will be president, and J. B. Reeves, secretary and treasurer.

Bureau of Yards and Docks, Navy Department, Washington, is asking bids (no closing date stated) for one electric-operated jib crane, 30-tons capacity, on steel tower, for submarine base at Pearl Harbor, T. H.; until May 20 for shop building at naval air station, Coco Solo, Canal Zone. Bureau will open bids May 5 for an engine lathe for Naval Air Station, Pearl Harbor, and on May 12 for a tool room precision lathe for the Naval Air Station, Hampton Roads, Va.

Philadelphia

CONTRACT has been let by Air Corps, Army Department, Washington, to Belmont Iron Works, Philadelphia, for 54 one-story airplane hangars, each 100 x 240 ft., at different Government flying fields, at cost of about \$1,000,000.

Board of Public Education, Keystone Building, Philadelphia, will receive bids until May 5 for boilers, forced-draft fan, electrical supplies and other equipment for public schools. Edward Merchant is secretary and business manager.

McQuay-Norris Mfg. Co., 1126 Hamilton Street, Philadelphia, manufacturer of piston rings, bearings, etc., with main plant at St. Louis, has leased 10,000 sq. ft. in building at Twenty-third Street and Allegheny Avenue for new factory branch, storage and distributing plant.

Commissioner of Institutions and Agencies, State Office Building, Trenton, N. J., is asking bids until May 6 for watertube boilers, feed-water heater and auxiliary equipment for State prison at Trenton; also for two centrifugal motor-driven pumping units, each with capacity of 750 gal. per min. for State hospital at Greystone Park.

Keystone Metal Stamping Works, Inc., Philadelphia, has been organized with capital of \$25,000 to take over and expand company of same name, with local plant at 550 North Fifth Street. New company is headed by George A. Dether and Daniel Gillis.

Chicago

BIDS will be taken at once by Firestone Tire & Rubber Co., Akron, Ohio, for one-story factory branch, storage and service building at Springfield, Ill., to cost over \$65,000 with equipment.

R. M. Eddy Foundry Co., 372 West Grand Avenue, Chicago, manufacturer of gray iron castings, etc., is considering rebuilding four-story plant recently destroyed by fire, with loss over \$100,000 including equipment.

Tempe Aircraft Corp., 2723 Poplar Avenue, Chicago, recently organized with capital of \$100,000, is considering operation of local plant for manufacture of airplanes, including assembling. Andre Tempe and William J. Poss head new company.

State Commission of Administration and Finance, State Capitol, St. Paul,

Minn., has secured appropriation of \$30,000 for foundry addition at State prison, Stillwater, for which plans will be drawn by C. H. Johnson, 360 Robert Street, St. Paul, State architect. A print shop addition also will be built with appropriation of \$15,000.

Construction Quartermaster, United States Army, Air Post, Scott Field, Belleville, Ill., will have plans drawn for new buildings at local air field, including hangars, repair shops and other field units, to cost over \$3,000,000 with equipment.

Otter Tail Power Co., Fergus Falls, Minn., is considering extensions and improvements in steam-operated electric power plant at Hankinson, N. D., including installation of additional equipment.

Chicago Transformer Corp., 2626 West Washington Boulevard, Chicago, manufacturer of electric transformers and kindred equipment, has arranged for increase in capital from \$50,000 to \$150,000 for expansion.

F. J. Bittermann Co., Joliet, Ill., manufacturer of stacks, breechings, storage tanks and other steel plate construction, has been reorganized and recapitalized as F. J. Bittermann Steel Products, Inc., and is offering 5000 shares of 7 per cent cumulative preferred stock. Company is planning for new works.

Gulf States

PLANs are under way by Jefferson Lake Oil Co., New Orleans, for new sulphur plant at Lake Peigneur, Jefferson Island. Initial plant will cost more than \$150,000 with machinery. R. J. Abshire is one of heads of company.

Quartermaster, United States Army, William Beaumont General Hospital, El Paso, Tex., will receive bids until May 11 for oil and gas-burning equipment.

Swift & Co., 48 N. W. Eleventh Street, Miami, Fla., meat packers, will build a refrigerating and mechanical cooler unit to local plant, to cost about \$40,000. Headquarters are at Chicago.

Bischof Airplane Mfg. Co., Fort Worth, Tex., will remove aircraft plant to Cleburne, Tex., where production will be concentrated, including parts production and assembling. Company will develop facilities for manufacture of two-seat training planes and three-seat sport models.

Panhandle Refining Co., Culbertson Building, Wichita Falls, Tex., contemplates new oil topping and refining plant in Young County, to cost over \$150,000 with equipment.

Kimbell Milling Co., 2100 South Main Street, Fort Worth, Tex., has awarded contract to Jones-Hettelsater Construction Co., Mutual Building, Kansas City, Mo., for addition to grain elevator, to cost about \$125,000 with conveying, screening and other equipment.

Baton Rouge Electric Co., Baton Rouge, La., has arranged for bond issue of \$1,000,000, part of fund to be used for extensions and improvements in plants and system.

Shamrock Oil & Gas Co., care of J. B. Orr, Fownes & Orr, Inc., Clark Building, Pittsburgh, Pa., investment securities, is planning a natural gas pipe line from Amarillo, Tex., to Fort Worth, about 245 miles, to cost over \$6,000,000 with com-

pressor stations and other equipment. Project will be carried out by Shamrock Natural Gas Co., an affiliated organization.

Emery, Peck & Rockwood Development Co., Austin, Tex., has awarded contract to Fegles Construction Co., Minneapolis, for power dam on Colorado River at Hamilton, near Burnet, Tex., 270 ft. high and 10,500 ft. long, to cost close to \$3,000,000. Dam will be used for a hydroelectric generating plant to be built later, to cost over \$1,500,000 additional with machinery and transmission lines. Fargo Engineering Co., Jackson, Mich., is engineer.

City Council, Galveston, Tex., is considering erection of a municipal electric light and power plant, including turbo-generator unit and auxiliary equipment, to cost \$985,000. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is consulting engineer.

Milwaukee

BIDS are being taken by Frank J. Hoffman, architect, James Block, Racine, Wis., for a factory extension, 50 x 204 ft., one story, to branch plant of J. I. Case Co., agricultural machinery, Racine, at Oklahoma City, Okla. Cost is estimated at \$65,000 with equipment.

Merritt-Chapman & Whitney Corp., Duluth, Minn., is low bidder at \$84,000 for a U-shaped warehouse and shop, 161 x 202 ft., for United States Engineering Department at Sault Ste. Marie, Mich.

Business of Neenah Foundry Co., Neenah, Wis., has been incorporated without change of name and with a capital stock of 1000 shares of common stock of \$100 par value. Principals are E. J. Aylward, Eunice B. Aylward and James P. Keating. There is no change in ownership or management.

Cleveland Cap Screw Co., Cleveland, has established a branch warehouse and office at 90 Second Street, Milwaukee, under management of Ralph Bean.

Buffalo

EXPANSION and improvements will be carried out by Buffalo Electric Furnace Corp., Tonawanda, N. Y., including one-story addition, to cost over \$85,000 with equipment. Company has arranged for increase in capital from \$280,000 to \$400,000.

Lake Erie Engineering Corp., 268 Perry Street, Buffalo, manufacturer of oil well equipment, hydraulic machinery, parts, etc., has awarded general contract to John W. Cowper Co., Inc., Rand Building, for new one-story plant at Tonawanda, 115 x 500 ft., for foundry, machine shop, forge shop, assembling and other departments, to cost over \$100,000 with machinery. Present works will be removed to new location.

H. J. Dowling, 181 Main Street, Oneida, N. Y., and associates have organized Line Material Co. of New York, Inc., and plan operation of factory for manufacture of electric transmission line specialties, insulating materials, etc. New organization will be affiliated with company of same name, operating plant at South Milwaukee for production of similar products.

American Fork & Hoe Co., Dunkirk,

"And do you read the advertising pages?"

we asked.

.... "Why, bless your soul,"

responded the works manager of a well-known pump company,

"if we didn't how could we keep up to date on the equipment and materials we work with?"

As you go over the advertising pages of this issue notice the number of ideas it will pay you to know about—and how attractively they are presented. In The Iron Age you will find displayed for your guidance and help a more comprehensive array of necessary data on the equipment, materials and services you use than in any other industrial paper.

Not every manufacturer whose product you can use to advantage uses The Iron Age to establish contact with you, but the exceptions are rare. And you can rest assured when by reading The Iron Age every week, editorial and advertising pages alike, you are insuring yourself against failure to be informed of a development in the industry that you should know about.

DO YOU KNOW THAT

AN ALLOY ZINC has such high impact strength that it can be die cast into golf club heads, able to endure mistreatment at the hands of the highest handicapper.

A CUT-OFF GRINDING WHEEL will cut 1 1/8 in. steel rods in 1.5 seconds without throwing a burr or burning.

A NEW HEAVY DUTY MULTIPLE DRILLER will push twelve 1 1/4 in. drills through steel, using a heavy feed.

A NEW SQUIRREL CAGE ELECTRIC MOTOR has a renewable winding-core. When the core is damaged in service it may be pressed out quickly and a new winding inserted.

A NEW CUPOLA CHARGING BUCKET has a cone-shaped bottom which drops while the bucket is held in one position by means of hooks, reducing the time the bucket is inside the cupola.

These are just a few specimens of the wealth of valuable and interesting information in the advertising pages of this issue. To keep well-informed, read the advertising pages every week.

N. Y., is arranging for removal of equipment at local plant for production of hollow-back shovels to branch plant at Conneaut, Ohio, formerly works of Conneaut Shovel Co., where such line of manufacture will be carried out in future. Shovels of other type will be produced at Dunkirk works.

Granger & Co., 135 Scott Street, Buffalo, wholesale grocers, have plans for a two-story storage and distributing plant, 100 x 140 ft., with installation of conveying and other handling equipment, to cost about \$90,000. George S. Rider & Co., Marshall Building, Cleveland, are architects and engineers.

▲▲▲

Pittsburgh

PROPERTY has been secured at Denbo, Pa., by Gulf Refining Co., Frick Annex, Pittsburgh, as a site for new bulk oil storage and distributing plant with capacity of about 500,000 gal., to cost over \$75,000 with equipment.

United States Engineer Office, Pittsburgh, will receive bids until May 5 for lock operating machinery for new lock No. 4, Monongahela River. Bids are also being asked by same office, no closing date stated, for one 15-ton steel hull whirler derrick boat.

Blaw-Knox Co., Blawnox, Pittsburgh, manufacturer of iron and steel products, road machinery, etc., has arranged with American Tractor Equipment Co., Peoria, Ill., for manufacture and distribution of its tractors and affiliated equipment in eastern part of United States and in foreign countries. Production will be carried out at main works at Blawnox.

Wagner Electric Corp., 5031 Liberty Avenue, Pittsburgh, with main plant at St. Louis, has leased building to be erected at 4822-30 Baum Boulevard, to cost over \$85,000 with equipment, for local factory branch, storage and distributing plant.

Pennsylvania Engineering Works, New Castle, Pa., manufacturer of rolling mill machinery, parts, etc., is carrying out expansion and betterments at local plant with view to adding additional lines of production.

Borough School District, Bellevue, Pa., James W. Graham, secretary, is asking bids until May 11 for supplies for school shops for year 1931-32. Specifications on file at office of J. Nelson Mowls, school superintendent.

▲▲▲

Cincinnati

PLANS have been filed by Truscon Steel Co., Dixie Terminal Building, Cincinnati, with main steel fabricating works at Youngstown, for one-story storage and distributing plant, 80 x 150 ft., to cost over \$40,000 with equipment.

City Council, Lebanon, Tenn., has plans for a pumping plant and filtration works, to cost \$200,000 with machinery. Wiedeman & Singleton, Candler Building, Atlanta, Ga., are consulting engineers.

Contracting Officer, Wright Field, Dayton, Ohio, is asking bids until May 4 for quantity of seamless steel tubing; until May 12 for 250 bomb assemblies; until May 13 for two electric-operated blueprinting machines.

Board of Education, Bellefontaine, Ohio, has authorized installation of manual training equipment in new two-story high school addition to cost \$200,000, for which bids have been asked on general contract. Walker & Norwick, American Building, Dayton, Ohio, are architects.

Ohio Fuel & Gas Co., Springfield, Ohio, is considering erection of new artificial gas plant at Mechanicsburg, Ohio, to cost \$75,000 with equipment. E. D. Abbott is district manager.

Joseph G. Harding, Columbus, Ohio, and associates have organized Harding Foundry & Furnace Supply Co., with capital of \$25,000, and plan operation of local plant. Company is represented by Beman, Thomas & Co., Huntington Bank Building, Columbus, attorneys.

City Council, Lebanon, Tenn., plans installation of electric-operated pumping machinery, filtration equipment and other apparatus in connection with extensions and improvements in waterworks to cost \$200,000. Bids will be asked early in May. Wiedeman & Singleton, Candler Building, Atlanta, Ga., are consulting engineers.

County Board of Education, Knox County, Knoxville, Tenn., W. W. Morris, superintendent, has secured appropriation of \$500,000 for school work, about one-half of sum to be used for new two-story central high school, for which plans will soon be drawn. Manual training department will be installed.

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Indiana

CITY COUNCIL, Crawfordsville, is asking bids until May 4 for 950-hp. watertube boiler, with superheater, soot blower, forced draft chain grate stoker and auxiliary equipment for municipal power plant. Plans have been drawn for extensions and alterations in building, for which bids will be received on May 18. Harry C. Carroll, 360 North Michigan Avenue, Chicago, is consulting engineer.

Corcoran-Brown Lamp Co., Connersville, has been organized to consolidate Indiana Lamp Co., with local plant for manufacture of automobile lighting equipment; Thomas J. Corcoran Lamp Co., 4890 Spring Grove Avenue, Cincinnati, manufacturer of kindred equipment; and John W. Brown Mfg. Co., Columbus, Ohio, manufacturer of automotive lighting units and equipment. New organization will continue present plants and will have assets totaling more than \$5,000,000. G. P. Doll, president of Corcoran company, will head organization.

George Erdheim, Gary, and associates have organized Erdheim Sheet Metal Roofing Co., to operate a local sheet metal works. Sigmund Wachs, Gary, is interested in new company.

Northern Indiana Power Co., Traction Terminal Building, Indianapolis, has applied for permission to take over Wabash Valley Electric Co., with properties valued at \$5,823,000, and Attica Electric Co., with plants and system valued at \$870,000. Purchasing company plans expansion and improvements in different districts, including transmission lines.

Midland United Co., 122 South Michigan Avenue, Chicago, operating electric light and power utilities in Indiana, has acquired Gary Heat, Light & Water Co., Gary, and plans expansion, including line and other construction.

Cleveland

PLANS are under way by Ohio Carbon Co., 12508 Berea Road, Cleveland, manufacturer of carbon brushes for electrical service, electrical contacts, etc., for a one-story addition, to cost about \$45,000 with equipment. George S. Rider & Co., Marshall Building, are architects and engineers.

Board of Trustees, Huron Road Hospital, 8811 Euclid Avenue, Cleveland, has plans for a new power house, installation to include steam power equipment for central heating service, pumping machinery and refrigeration equipment, to cost over \$100,000. George S. Rider & Co., Marshall Building, are architects and engineers.

Morrison Lead Co., Toledo, Ohio, recently organized by A. W. Morrison and Herbert Castle, 1053 West Woodruff Avenue, is considering operation of local plant for production of lead and kindred products.

Cleveland Provision Co., 2527 Canal Road, Cleveland, will take bids for new two-story packing plant, totaling about 125,000 sq. ft. floor space, to cost over \$200,000 with conveying and other mechanical-handling equipment. Peter Henschien, 59 East Van Buren Street, Chicago, is architect and engineer.

Bucyrus Airport, Bucyrus, Ohio, affiliated with Bucyrus Institute of Aviation, plans erection of new hangar, with repair shop and other field units, for which plans will be completed early in May.

Smith Engineering Co., 1982 West Seventy-fourth Street, Cleveland, is considering installation of equipment for aircraft parts production.

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Detroit

PLANS are under way by White Star Refining Co., 903 West Grand Boulevard, Detroit, for an addition to oil refinery at Trenton, Mich., to cost close to \$60,000 with equipment.

Evinrude Motor Co., Milwaukee, manufacturer of marine motors, parts, etc., has arranged for removal of Detroit factory branch to Flint, where expansion will be carried out.

Board of Trustees, Michigan School for Deaf, Flint, is planning installation of a mechanical shop in connection with new two and three-story unit at Institution, entire project to cost over \$130,000. MacKenzie & Pratt, Flint, are architects.

Timken-Detroit Co., Clark Avenue, Detroit, manufacturer of oil burners and parts, subsidiary of Timken-Detroit Axle Co., is carrying out expansion and improvements at plant, to provide for considerable increase in capacity.

Stone Electric Heater Co., 1132 Clay Avenue, Detroit, recently organized, plans operation of local factory for manufacture of electric heaters and kindred appliances. Albert J. Stone and E. J. Ricard are heads.

Great Atlantic & Pacific Tea Co., 420 Lexington Avenue, New York, has leased building to be erected at Flint, Mich., by General Land Co., a subsidiary of Pere Marquette Railroad Co., for a new baking plant, storage and distributing branch, installation to include ovens, power



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equipment, conveying and other machinery to cost close to \$200,000. Building contract has been let to Owen-Ames-Kimball Co., Grand Rapids, Mich.

Reiss Efficiency Tool Co., Kokomo, Ind., manufacturer of tools and devices for automatic setting of bolts, screws, etc., is arranging for establishment of new plant at Sturgis, Mich., where production will be concentrated and increased. Sturgis Merchants' Association, Sturgis, is interested in project.

St. Louis

BIDS have been asked on general contract by National Air Transport Co., 5936 South Cicero Avenue, Chicago, for one-story hangar, 120 x 120 ft., with one-story lean-to extension for machine and repair shop, at municipal airport, Kansas City, Mo., to cost about \$85,000 with equipment. R. H. Higgins, address noted, is company engineer.

Sun Electric Mfg. Co., St. Louis, recently organized by E. J. Rauch, 2410 South Fourth Street, and associates, plans operation of local factory for manufacture of violet ray lamps and equipment, electric bath cabinets and similar electrical apparatus.

Nye-Jenks Grain Co., Omaha, Neb., is planning erection of new grain elevator, including elevating, screening, conveying and other equipment, to cost about \$350,000.

Board of Trustees, Creighton University, Twenty-fifth and California Streets, Omaha, Neb., has plans for a new multi-story engineering school, to cost over \$200,000 with equipment.

General Engineering & Mfg. Co., 1523 South Tenth Street, St. Louis, manufacturer of special machinery, parts, etc., has purchased shaper manufacturing division of R. A. Kelly Co., Xenia, Ohio. Equipment will be removed to St. Louis plant, where production will be carried out in future.

Federal Steam Specialties Co., 120 East Main Street, Oklahoma City, has awarded general contract to Campbell & Price, 605 West Main Street, for two-story equipment storage and distributing plant, with pipe-fitting and mechanical shop, 30 x 132 ft., to cost over \$25,000 with equipment. Layton, Hicks & Forsyth, Brandiff Building, are architects.

Pacific Coast

BIDS will be received by City Council, Vernon, Cal., until May 6 for equipment for municipal power plant, including Diesel engine, generators, exciters, pumping machinery, air blowers and auxiliary equipment. Howard McCurdy is city engineer; T. J. Furlong is city clerk.

International Sugar Co., 637 Battery Street, San Francisco, contemplates a new refinery near Los Angeles, including power house, machine shop and other units, to cost over \$1,000,000 with equipment.

Arizona Compress & Warehouse Co., Coolidge, Ariz., has plans for a new cotton compress and storage plant, to cost about \$100,000 including compresses, conveying equipment and other machinery.

Salt River Valley Water Users' Association, Phoenix, Ariz., is disposing of a bond issue of \$1,800,000, part of fund to be used for expansion and improvements in electrical and irrigation properties.

Board of Directors, Municipal Electric Light Plant, Pasadena, Cal., is asking bids until May 15 for steam condenser for electric power station. Installation will cost about \$50,000. City has acquired property on Skillen Alley, and will remodel for new power substation to cost about \$90,000 with equipment.

County Board of Supervisors, Court House, San Francisco, has authorized immediate construction of water pipe line for Hetch Hetchy project in San Joaquin Valley district, about 47 miles, to cost \$7,000,000. Bids will close about May 6. Main pipe line will be 60-in. diameter.

Utah Power & Light Co., Salt Lake City, Utah, has secured permission to erect a steam-operated electric generating plant on Utah Lake, to cost over \$150,000 with equipment. Company engineering department will be in charge.

Buttress & McClellan, 1913 East Eighth Street, Los Angeles, machinery and parts, are planning new works, consisting of two one-story units, 50 x 200 ft., to cost about \$40,000 with equipment. A traveling crane will be installed.

City Council, Logan, Utah, has plans for an addition to municipal electric light and power plant, with Diesel engine of 600-kw. capacity and accessory equipment, to cost about \$60,000.

Albert C. Martin, Higgins Building, Los Angeles, architect, has plans for a one, four and five-story automobile service, repair and garage building, 50 x 140 ft., to cost over \$200,000 with equipment.

Board of Education, Santa Barbara, Cal., will soon begin erection of a new high school group, with one-story manual training shop, to cost about \$500,000. William H. Weeks, 525 Market Street, San Francisco, is architect.

Orange Mutual Citrus Association, Orange, Cal., has asked bids on general contract for a two-story and basement precooling plant, 85 x 120 ft., with electric and mechanical equipment for capacity of 60 railroad cars at one time, to cost about \$80,000. J. G. Vrydagh, 505 South Birch Street, Santa Ana, Cal., is architect.

Canada

PLANS are under way for a \$15,000 addition to plant of Shirley, Deltrich Co., Ltd., Galt, Ont.

Norge Electric Refrigeration, Ltd., care of De Forest-Crosley Co., Ltd., 245 Carlaw Avenue, Toronto, is contemplating erection of a manufacturing plant.

Canadian Gypsum Co., Ltd., 1221 Bay Street, Toronto, will erect a plant at Willow Grove, Ont., and expects to have it ready for production by fall. Mr. Rogers, Royal Connaught Hotel, Hamilton, Ont., is in charge.

Thermolaire & Refrigeration, Ltd., 5182 Cargrain Street, Montreal, is considering erection of a factory.

Canadian Hoists & Conveyors, Ltd., Canada Cement Building, Montreal, has been formed to manufacture material handling equipment, etc. It is contemplating manufacturing operations and is interested in equipment. D. W. Coe is managing director.

Montreal plant of the Eugene F. Phillips Electrical Works, Ltd., manufacturer of round and flat copper rods, bare and insulated electric wire etc., will be moved to Brockville, Ont., where a plant is now being erected. Some new equipment will be purchased. H. D. Johnston is chief engineer.

Crescent Wire & Iron Works, Ltd., Princess and Nelson Streets, Kingston, Ont., has let contract to Thomas A. Andre, 324 Johnston Street, for a new plant. Equipment to be purchased will include a small crane and polishing machinery.

Southern Ontario Gas Co., Ltd., Canada Building, Windsor, Ont., has applied for a franchise to supply gas to border municipalities. Company contemplates erection of \$1,000,000 gas plant.

George W. Reed & Co., Ltd., 4107 Richelieu Street, Montreal, is having plans prepared by T. Pringle & Sons, Ltd., 410 St. Nicholas Street, for erection of a foundry.

National Fence Co., Ltd., Scott Building, Winnipeg, Man., has plans for a factory at Red Deer, Alta., 50 x 75 ft., to cost \$20,000.

Fraser Brace Engineering Co., Ltd., has been awarded contract for a plant at Copper Cliff, Ont., for International Nickel Co. of Canada, Ltd., 25 King Street West, Toronto, on a cost plus basis.

Maritime Paper Products, Ltd., Pickings and Wilson Roy Building, Halifax, N. S., has awarded contract to W. G. Foley, St. Albans Street, for erection of a plant, to cost \$50,000.

Town Council, North Sydney, N. S., is considering erection of a power plant to cost \$110,000. F. J. Kelley is mayor.

Foreign

PLANS are under way by Vacuum Oil Co., 61 Broadway, New York, for erection of two or more oil refineries in France, for which contracts will be carried out by Foster-Wheeler Corp., 165 Broadway, New York, to cost over \$3,000,000 with machinery.

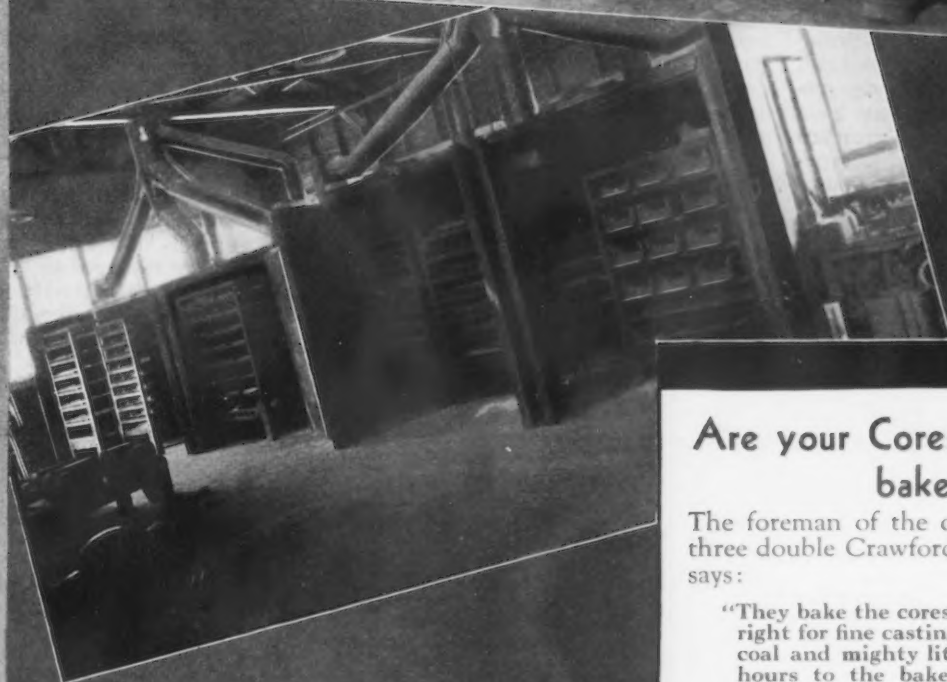
Southern Railway Co., Southampton, England, is arranging fund of about £3,000,000 (\$14,610,000) for extensions and improvements in local docks, including new dry dock to cost about \$9,000,000, scheduled for service in 1933. Project will include installation of cranes, conveying machinery and other mechanical-handling equipment.

Pan-American Petroleum & Transport Co., 122 East Forty-second Street, New York, has purchased controlling interest in Petroleum Storage & Finance Corp., Ltd., London, England, operating a number of British oil marketing companies. Purchasing company contemplates general expansion, including increased storage and distributing facilities in different districts. Acquisition includes Ellsmere Port Oil Wharves, Ltd., with terminals on Manchester ship canal.

Elwerath Gewerkschaft, Hanover, Germany, has awarded contract to Arthur G. McKee & Co., 2422 Euclid Avenue, Cleveland, engineers and contractors, for new oil refinery at Misburg, near Hanover, including cracking unit for gasoline production and other by-products divisions, to cost \$1,000,000 with equipment.

Following recent increase in capital to 60,000,000 fr. (about \$2,535,000), Com-

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▲ ▲ Business as Others See It ▲ ▲

Digest of Current Financial and
Economic Opinion

INSISTENCE upon the necessity to reduce wage scales features a number of reviews. The theory is that capital has been savagely adjusted downward through decreased or omitted dividends and that labor must bear its share of the deflation.

Lower Costs Essential to Adequate Sales

As Benjamin Baker puts it, in *Annalist*: "It should be quite obvious that, with sweeping reductions in earnings and dividends, an ultimate lowering of all elements in the cost of production is unavoidable. . . . Lessened operating time means lessened output, and the unit cost of this output will be raised if wage rates are maintained. This is obviously not the way to successful marketing of manufactured products in a time of falling prices and diminished purchasing power."

Union Trust Co., Cleveland, thinks it probable that "wage reductions in many lines may have to be made through sheer pressure of economic necessity . . . especially in fields where wages have been so high as to be clear out of line with the general economic structure."

And *Financial Chronicle* calls for wage adjustments, quoting Magnus W. Alexander as authority for the present necessity, but stipulating that they should not exceed

in depth of cut the drop which has taken place in commodity prices—thus to "maintain the American standard of living."

That doughty publication sees the current flood of dividend curtailments as doing about as much damage to purchasing power as wage cuts could possibly achieve. And the query will not down: What is a corporate surplus for, if not to maintain dividends in time of stress?

Marking Time Across the Valley

Practically all of the business indexes have been moving virtually sidewise for four or five months. This, it is pointed out, is quite in line with precedent. Brookmire, for instance, commenting on this, expects to see a good rise after another month or so. That service envisions the industries which have been worst hit by the depression as the very ones which will bound furthest out of it, once the bounding movement gets well under way.

These are the lines catering to "spasmodic or postponable demand," as distinguished from those dealing with the every-day necessities of life. And the steel industry, automobiles and housing are listed among the "postponables."

This sidewise movement of business is normal at this stage of the

cycle, in the opinion of the Midland Bank, Cleveland. Four previous occasions are quoted in which this occurred—1885, 1893, 1908 and 1921. In each case there was a drop of 27 to 33 per cent in business activity, then a "bottom" of four to nine months, followed by a definite turn upward.

Supporting this same view, Guaranty Trust Co., New York, looks for a "recovery at the end of the summer." Meantime, it finds business sentiment improving, though with no indication of present enlarged activity. Harvard Economic Society sees the same condition of a "flat" curve, with slight changes—manufacturing being moderately up from a month ago, and mining down.

Finished Goods Must Come Down in Price

Price stabilization is receiving much thought. Until raw materials and finished goods are in closer adjustment, says Alexander Hamilton Institute, no permanent gain in activity can be made.

And, with what the farmer produces still on the toboggan, what he has to buy will have to yield, if the adjustment is to be made. The institute finds raw materials in March 30 per cent below the 1929 peak; finished goods, less than 20 per cent down.

pagnie Grand Ducale d'Electricite du Luxembourg, Grand Duchy of Luxembourg, is arranging for purchase of controlling interest in Societe de Transport d'Energie Electrique d'Alsace et de l'Est, operating electric light and power properties in Province of Alsace and plans expansion, including development of power generating facilities and transmission lines. Harris, Forbes Holding Co., an interest of Harris, Forbes & Co., 56 William Street, New York, securities, is interested in project.

Hawaiian Pineapple Co., Ltd., Honolulu, Hawaii, operating fruit canning plants, is arranging for a note issue of \$5,000,000, part of proceeds to be used for expansion in packing and distributing facilities. Company has offices in United States at 215 Market Street, San Francisco.

Supplies and Tenders Committee, Department of Public Works, Wellington, New Zealand, will receive bids until June 2, for a quantity of electric induction voltage regulators. New Zealand Government Railroads, Wellington, are asking bids until June 19, for one 10-ton electric traveling crane.

New Trade Publications

Steel Shelving.—Universal Fixture Corp., 135 West Twenty-third Street, New York. Folder describing steel shelving constructed without the use of bolts.

Cement Tile.—Federal-American Cement Tile Co., 608 South Dearborn Street, Chicago. A 48-page booklet describing cement tile roof, wall and floor slabs and showing buildings and industrial plants in which the product has been used.

Steel Replacement Roller Chain.—Baldwin Division of Baldwin-Duckworth Chain Corp., Worcester, Mass. Bulletin No. 40, describing steel replacement roller chains, designed and built to run over the same sprockets as malleable detachable, riveted malleable, or saw mill, malleable iron and steel combination chains.

Mechanical Gas Producer.—Wellman Engineering Co., Cleveland. Bulletin 92, featuring a mechanical gas producer. Producer gas economies, also the use of steam, are dealt with.

Tool Steels.—McInnes Steel Co., Corry, Pa. A small, illustrated, 30-

page pamphlet describes the various brands of crucible and other tool steels made by this company, including the heat treating.

Steel Castings.—Lebanon Steel Foundry, Lebanon, Pa. An illustrated leaflet describing the Circle "L"-2 brand of alloy steel castings produced by this company and some of the uses to which they are put.

Steel Castings.—Sivyer Steel Casting Co., Milwaukee. A 4-page folder, illustrated, is No. 8 of Vol. 5 of a series of reports describing this company's product and illustrating how heat treating is scientifically controlled.

Cap Screws.—Chandler Products Corp., Cleveland. Catalog, 16 pages, stresses the important place occupied by cap screws in industry and the manufacturing and inspection methods that are followed in the company's plant to produce a product of the highest quality. Numerous illustrations of sections of the company's plant showing some of the equipment used are included.

Safety Circuits.—Crouse-Hinds Co., Syracuse, N. Y. Bulletin 2213 of eight pages showing plugs and receptacles for use in safety circuits for electrical equipment.

